Summer 2023

Shakespeare in Virtual Reality: Social Presence of Students in a Virtual Reality Book Club

John Funchess Ott Jr.

SHAKESPEARE IN VIRTUAL REALITY: SOCIAL PRESENCE OF STUDENTS IN A VIRTUAL REALITY BOOK CLUB

by

John Funchess Ott, Jr.

Bachelor of Arts
University of South Carolina, 2013

Master of Education
Converse College, 2018

Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Education in

Educational Practice and Innovation

College of Education

University of South Carolina

2023

Accepted by:

Fatih Ari, Major Professor

Tammi D. Kolski, Major Professor

Hengtao Tang, Committee Member

Lucas Vasconcelos, Committee Member

Anna Clifford, Committee Member

Ann Vail, Dean of the Graduate School

DEDICATION

This dissertation is dedicated to my immediate family. Thank you to my parents, John and Cindy Ott, for teaching me so much. Thank you for encouraging me to pursue my education through the years. Thank you, Kimberly Ott and Caroline Ott Baccene, for so many great memories.

ACKNOWLEDGEMENTS

I'd like to acknowledge Dr. Ari and Dr. Kolski for their guidance and assistance during this dissertation process. Thank you for helping me pursue this line of research. I'd also like to give a special thanks to my father, John Ott, for providing virtual reality Shakespearean performances for students in this study. May many more actors perform in virtual reality in the future.

ABSTRACT

The purpose of this mixed methods study was to implement and evaluate the impact of a virtual reality book club on the social presence of students. This research examined participants using virtual reality headsets to study the works of William Shakespeare. This study examined two research questions: 1) How does the implementation of a virtual reality technological innovation affect students' knowledge of Shakespearean works? 2) How does the implementation of a virtual reality technological innovation affect social presence in students? Participants interacted within virtual worlds with one another and the researcher. Data was collected using a pre-post assessment test, writing prompts, weekly multiple-choice questions, and participant interviews to measure the participant's knowledge of Shakespearean works. Three quantitative measures were used to assess social presence within the virtual reality experience. Participant interviews and writing prompts were also used to assess social presence through a qualitative lens. Both quantitative and qualitative measures highlighted the role of social presence within virtual reality. Quantitative and qualitative data suggested that students can learn about the works of Shakespeare while also building social presence. Qualitative data highlighted the enjoyment and engagement students experienced while also promoting social connection. The majority of students interviewed stated that it was easier to make friends in virtual reality when compared with the real world. This study may serve as a model for future researchers to draw upon for using mixed methods research in studying both social and academic elements when using innovative educational technology.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

National Context

Challenges relating to rural students, homeschooling, and charter schools are relevant when considering the national context of education in the United States (Chambers, Crumb, & Harris, 2019; Dallavis & Berends, 2023; Sikkink & Skiles, 2015). All three of these aspects of American education have been discussed in relation to remote learning (Carpenter & Gann, 2016; Mann, Kotok, Frankenberg, Fuller, & Schafft, 2016; Waters, Barbour, Menchaca, 2014). A lack of social presence and lackluster academic achievement in past online instruction may be one factor dissuading students in rural settings from participating in online learning. Past research has examined the concept of social presence in the context of students experiencing virtual worlds (Bulu, 2012; Rahman, et al., 2019). By providing students with high-quality online learning opportunities the reach of educational technology is expanded. While using virtual reality experiences in a social setting is not a new concept (Mystakidis, Berki, & Valtenin, 2021) as an educational intervention, there is a gap in the existing literature for how virtual reality applications can be used in an educational capacity. Even though students and teachers may be represented as digital avatars as they communicate to each other in the virtual world, researchers should take into account the national and local context of the student.

Research has discussed challenges in teaching reading and writing among populations of learners in rural settings (Azano, Callahan, Brodersen, & Caughey, 2017; Rasheed, 2020). Donovan (2016) examined the effect of place-based writing on improving high school students' writing skills in rural settings. The intervention of another study focused on increasing writing ability among gifted students in a rural setting, but failed to demonstrate any effect (Bass, 2019). The research of Graham and Teague (2011) concluded rural schools in the United States have considerably lower reading levels than their suburban counterparts and slightly lower reading levels than urban environments.

There are major challenges when providing high-quality educational services for students in rural areas. Rural schools in the United States allocate proportionally less fiscal and human resources than their suburban and urban counterparts (Grissom, Redding, & Bleiberg, 2019; Kettler, Russell, & Puryear, 2015). Rural students often live in areas that are mired in persistent poverty (Howley, Rhodes, & Beall, 2009). According to the United States Department of Agriculture, 301 of the 353 persistent poverty counties are rural. In addition, 85.27% of counties in persistent poverty and 71.75% of persistent child poverty counties are rural areas of the United States (United States Department of Agriculture Economic Research Service, 2019). One review of the literature found low levels of funding in rural areas lead to the hiring of teachers with less education, less experience, lower rates of teacher retention, and open the possibility that schools may spend resources on the disproportionate percentage of struggling students living in these areas (Howley et al., 2009). Remote, small, and rural schools are also

considerably less likely to offer Advanced Placement courses (Gagnon & Mattingly, 2016).

Advances in educational technology have been used to help students in rural areas. For example, throughout the United States advanced courses or coursework can be offered online to rural students by such organizations as Virtual Virginia, Duke, and Johns Hopkins University (Stambaugh, 2015). Howley et al. (2009) noted that teleconferencing, e-classes, and interactive video can be used to help high-achieving students in districts serving low-income students. This suggests that technology can play a role in bringing high-quality educational opportunities to students in rural areas. However, virtual instruction faces several challenges. The research of Sun and Chen (2016) focused on online education and concluded that although online education is likely to grow, one of the primary challenges facing the field is the development of a sense of community among learners. The concept of social presence can be operationalized as a concept characterized by group cohesion, open communication, and personal/affective projection in an online environment (Arbaugh et al., 2008). Greater social presence has been demonstrated to correlate with greater academic achievement, perceived learning, and course satisfaction (Horzum, 2017; Richardson, Maeda, Lv, & Caskurlu, 2017; Rockinson-Szapkiw, Wendt, Whighting, & Nisbet, 2016). This intervention explored the extent to which students participating in a virtual reality book club centered around books of Shakespeare experienced social presence with one another while also achieving academic growth.

A focus on social presence has particular salience in our current national context as an increasing number of students are taking classes online. The number of students

taking at least one online class increased from 31.1% in 2016 to 34.7% in 2018 (Lederman, 2018). In-person instruction ended for months for over 55 million students in 2020 with a lack of technological infrastructure becoming a significant issue for many students (Sharfstein & Morphew, 2020). Due to the increasing engagement still with online educational experiences, teachers should be working to overcome the challenges of creating social presence in an online environment. Using the power of virtual reality headsets and virtual reality applications as an educational technology intervention may provide students in both rural and urban settings with high-quality online learning opportunities. Additionally, social virtual reality used in an educational setting can provide opportunities for engaging educational experiences (Mystakidis et al., 2021).

The increase in the number of students homeschooling is also a relevant factor when thinking about the national context (Thompson, 2022). According to the National Center for Education Statistics, homeschooling increased twofold in the United States in the period from 2000 to 2016 to 1.7 million students (Wang, Rathburn, & Musu, 2019). Numerous studies have been conducted on socialization among homeschooled students, but some have critiqued research on the subject for methodological flaws (Kunzman & Gaither, 2020). One researcher notes that "The acquisition of social skills in homeschooling is dependent on the individual parent's approach towards homeschooling and their main objectives for adopting this method of child education" (Abuzandah, 2020, p. 1071). Thus, research on homeschooling and socialization is warranted by the rise in homeschooling in the United States.

Another national trend relevant to this research is the growth of charter school attendance (Wang et al., 2019). In 2000, 0.4 million students attended charter schools in

the United States. By 2016, that number had increased to 3 million (Wang et al., 2019). As of 2019, 7 percent of students participating in public schools were charter school students (National Center for Education Statistics, 2022). Scholars have noted that virtual charter schools have also increased at a rapid pace (Tong, Smith, Fienberg, & Kho, 2023). Some researchers argue that charter schools can contribute to socioeconomic isolation (Riel, Parcel, Mickelson & Smith, 2018). Thus, research relating to students from different educational backgrounds interaction with one another is relevant to the national context.

An educational intervention focused on offering advanced works of Shakespeare through virtual reality is warranted by the national context. Since this intervention will feature a digital component, this intervention can be studied using the concept of social presence as measured with the Community of Inquiry survey (Stenbom, 2018), an alternative scale regarding a narrower measure of social presence (Kreijns, Kirschner, Jochems, & Van Buuren, 2011), and an adapted Social Presence Survey (Harms & Biocca, 2004).

Local Context

This study used communication technology to connect students from traditional public schools with students who had experience in charter school and homeschooled environments. Additionally, many of the students participating in the research were from rural communities. Thus, this research gives students from rural settings the opportunity to interact with people from different backgrounds. This local context includes the various learning environments that the students of this study were participating in.

Orangeburg County has been classified as a rural area (Department of Health and Human Services, n.d.) This study can be conceptualized as aligning with the values of the New Rural Society proposed decades ago to use telecommunications to provide educational experiences to individuals in rural areas (Goldmark, 1972; Hughes, 2016). Orangeburg County is in South Carolina with an estimated population of 86,175. About 20% of individuals 25 and older have attained at least a bachelor's degree. The median household income in this county in 2022 was $38,052 in 2021 dollars (United States Census Bureau, n.d.). About a fourth of residents within Orangeburg County lack access to broadband internet access with a little over one out of four residents living in poverty (United States Census Bureau, n.d.). Around a fourth of students in the Orangeburg Consolidated School District have met or exceeded expectations on the SC READY English Language Arts assessment (Academic Achievement, 2023). As a district, the Orangeburg Consolidated School District has a poverty rate of 85.42% ("Data files," n.d.). Thus, the local context underscores opportunities for the creation of a virtual reality book club to help develop social presence and academic achievement in the language arts among school students attending a school in Orangeburg County. Three of the students in this study attend schools in the Orangeburg County School District ("OCSD Schools," n.d.).

This study also included students with homeschooling and charter school backgrounds. This study also included four homeschooled students. Homeschooling has increased in South Carolina over the years (Dodson, 2022). Two of the students had been enrolled in the same charter school in South Carolina, although one of them changed schools around the time the virtual reality book club intervention started. However, they

both had charter school experience. Thus, this study offers a chance to examine how students from a variety of educational backgrounds interact within virtual reality.

Statement of the Problem

Research has shown an association between social isolation and online learning (Priyadarshini & Bhaumik, 2020). Virtual reality was used to create an educational experience that connected students from different educational settings—including rural backgrounds—with innovative educational experiences. One scholar noted that virtual reality can allow students the opportunity to "explore Shakespeare for themselves" (McInnis, 2021, p.30) but also brings up the topic of access. Additionally, McInnis (2021) notes that there is a demand for inexpensive and scholarly virtual reality headsets. In a similar fashion, most of the students who participated in this research also experienced a lack of access to educational experiences powered with virtual reality technology. Regarding social presence, the community aspect of learning has been identified as a challenge facing online education (Sun & Chen, 2016). This research seeks to examine both the social and academic aspects of a virtual reality technological innovation experience for students from a variety of backgrounds.

Purpose Statement

The purpose of this mixed methods study was to implement and evaluate the impact of a virtual reality technological innovation on students' knowledge of Shakespearean works and social presence indicators when participating in virtual worlds relating to four works of Shakespeare.

Research Questions

The research questions that guide this study are:

1. How does the implementation of a virtual reality technological innovation affect students' knowledge of Shakespearean works?
2. How does the implementation of a virtual reality technological innovation affect social presence in students?

Researcher Subjectivities and Positionality

Using the continuum by Herr and Anderson (2005), I could be considered an insider in many respects of this study. The students have experience participating in varying educational institutions in South Carolina. I received my K-12 education from varied institutions in South Carolina as well. Some of the students even lived in the same rural county where I attended school and continue to reside. My position as an insider may have helped the students and their parents trust me when I sought their permission for participation in the study.

I am grateful to be pursuing this opportunity to use technology to create a unique educational experience for the students who chose to participate. I agree with the philosopher Francis Bacon that science and technology can be used to create a better world (McClellan & Dorn, 2015). Using virtual reality for an educational intervention while collecting data in a methodical manner demonstrates the power of science and technology. However, the exploration of beautiful worlds with the words of Shakespeare demonstrates the strength of the arts and humanities. Steve Jobs noted that "…technology alone is not enough…" and noted the importance of combining technology with the humanities" (Organisation for Economic Co-Operation and Development, 2015, p. 237).

Technology and the arts have a long history within the field of educational technology. In a text promoting the use of radio, film, still images, exhibits, and other

forms of audiovisual media in the classroom, Edgar Dale stated decades ago that "visual and auditory techniques offer great *opportunities for improving* learning; opportunities which we can scarcely envisage since the subject itself is so new" (Dale, 1946, p. 6). Both the United States military and airline used digital simulators developed in the 1960s for flight simulation (Page, 2000). One review on the use of virtual reality in education describes the use of flight simulation used for training in the 1960s as the earliest recorded use of a digital virtual reality system (Kavanagh, Luxton-Reilly, Wuensche, & Plimmer, 2017). This technology aligns with the concept of educational technology as being "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (Januszewski & Molenda, 2008, p. 1).

This research aligns with prescriptions for teaching associated with constructivist learning methods. This research also aligns with the constructivist view that learning should be an active experience for participants (Feyzi Behnagh & Yasrebi, 2020). Using virtual field trips for education has been viewed within the context of constructivist teaching methods (Cowden, DeMartin, & Lutey, 2006). Participant discussion is of paramount importance in applying constructive views on education. As research notes, "From social constructivist perspectives, interactions such as those achieved through classroom discussions are thought to provide mechanisms for enhancing higher-order thinking" (Palincsar, 1998, p. 357). However, it should be noted that there are also criticisms of ideas associated with constructivist views (Nola, 1997; Slezak, 1994).

Definitions of Terms

Social Presence: Social presence will be defined in the context of the community of inquiry model referring to the phenomena of open communication, group cohesion, and affective expression with a digital environment (Garrison & Arbaugh, 2007). However, a shorthand definition of social presence as being "sense of being with another in a mediated environment" (Biocca & Harms, 2002, p. 10) as well as a more elaborate definition has also been used in the context of the Networked Minds Theory and Measure (Biocca & Harms, 2002). These different conceptions of the concept are discussed in this dissertation.

Virtual Reality Book Club: A "virtual reality book club" refers to the educational intervention by which participants will participate in a virtual reality application with the researcher and fellow participants using the technology of the Quest 2 as well as the virtual reality applications Bigscreen and VR Chat (McVeigh-Schultz, Kolesnichenko, & Isbister, 2019; Yarramreddy, Gromkowski, & Baggili, 2018).

Virtual Reality Headset: A virtual reality headset is synonymous with a head-mounted display. These displays provide users with the feeling of being in a third-dimensional virtual setting (Bailey & Bailenson, 2017).

Virtual World: A virtual world has been defined as a shared setting where one's interaction with objects and other individuals is mediated using an avatar (Girvan, 2018).

CHAPTER 2

LITERATURE REVIEW

The purpose of this mixed methods study was to implement and evaluate the impact of a virtual reality technological innovation on students' knowledge of Shakespearean works and social presence indicators when participating in virtual worlds relating to four works of Shakespeare. This dissertation sought to answer the questions: 1) How does the implementation of a virtual reality technological innovation affect students' knowledge of Shakespearean works? and 2) How does the implementation of a virtual reality technological innovation affect social presence in students? This literature review provides support that these questions are worth asking while also providing guidance on the study's design.

Methodology for the Literature Review

This literature review examined various topics relating to this dissertation. Game-based feedback, gamification, game-based learning, community of inquiry, social presence, social isolation, learning presence, virtual reality, the Community of Inquiry survey, social interaction were all topics examined in this literature review. *Proquest, JSTOR*, and *Education Source* were used as databases to conduct the literature review. Google Scholar was also used to conduct this review. Combinations of certain terms noted in this section (Community of Inquiry and social presence, virtual reality, and games) were used to conduct this search.

Community of Inquiry and social presence. Numerous keywords related to Community of Inquiry and social presence were used to find articles relating to this dissertation. “Community of Inquiry,” “cognitive presence,” “Social Presence Community of Inquiry,” “Learning presence,” “Community of Inquiry Survey,” “Internet use,” “Meta-Analysis,” “Social Presence,” “Technology,” and “Social Interaction” were all terms used for this literature search. A combination of “Internet” and “Social isolation” plus other combinations of words from the listing above were also used.

Virtual reality. Virtual reality was also a topic examined in this literature review. A combination of “Virtual Reality” and “Education” was searched in the literature review. A combination of “Virtual Reality” and “Online Education” was examined.

Games. Numerous keywords related to games were used to find studies on the topic. The keywords “Gamification in Education”, “Game-based learning”, “Gamification in classroom” and “gamification” were all used in this research. “Games”, “Gamification”, and “Game-based instruction” were all terms used to explore studies.

Although these represent many of the keywords used in this literature review, they do not represent all the web search phrases used in this literature review. The website Google Scholar was used as a means of searching for other terms as well. I also drew from a variety of other sources, including but not limited to sources and references found in various papers.

This literature review seeks to cover several topics relating to this dissertation. These topics help define the germane key terms and justify the use of virtual reality as a means of providing online instruction. It should be noted that little research explores virtual reality technologies as a medium of online instruction itself (Kavanagh, et al.,

2017). The literature review consists of four sections, including (a) Teaching Shakespeare in the Twenty-First Century (b) Social Presence, (c) Virtual Reality, and (d) Theoretical Framework.

Teaching Shakespeare in the Twenty-First Century

The Common Core Standards discuss students studying works of Shakespeare in eleventh and twelfth grade. Indeed, the Common Core Standards require students to study Shakespeare in secondary school ("Common Core Standards for English Language Arts," 2010). This section will document topics related to Shakespearean knowledge, beginning with practices for teaching Shakespeare in the twenty-first century. Second, the use of virtual reality and student motivation to learn Shakespeare will be discussed. Third, the use of virtual reality and engagement when teaching Shakespeare will be examined.

Practices for Teaching Shakespeare

The topic of making the plays of Shakespeare relevant to students in the twenty-first century using creativity has been discussed in a text recommending the use of numerous technologies (Kucharczyk & Kucharczyk, 2022). Film has been examined as one way to use imagery to provide instruction for students relating to Shakespeare (Gibson, 2016). Whether used in a high school setting or higher education institution, numerous filmed adaptations of Shakespeare's works are noted within the literature to be of pedagogical value (Dakin, 2009; Gibson, 2016). Yet Cohen (2018) discusses limitations of using film when teaching Shakespeare and recommends that teachers not assign filmed versions of Shakespeare if they don't enjoy the film themselves. Film is not the only method in which to show imagery relating to Shakespeare. Photography and

art have also been discussed as tools to help students learn about the content of Shakespeare's works (Dakin, 2009).

The use of history has also been examined in the literature for how to teach Shakespeare. While warning against teachers overemphasizing the focus on history, Cohen (2018) admits that specific historical background relating to England can be beneficial in an educational context. Thompson and Turchi (2016) offer a critique about focusing on the historical era in which Shakespeare wrote while Gibson (2016) states that political perspectives of Shakespeare can include "New historicism" which uses historical context in reading the text (p. 33).

Social interaction has also been discussed in the literature about teaching Shakespeare. Cohen (2018) recommends the use of pairing learners into dialogue teams when having students memorize passages or having teachers staging scenes from the works in the classroom. Gibson (2016) discusses placing the students in groups and engaging them in a series of questions where the group members respond using both physical gestures and vocals. Gibson also discusses the students participating in a tableaux activity in pairs or groups where the students pose as characters from the Shakespearean work. As Gibson notes when discussing the importance of the social element in studying Shakespeare, "Shakespeare is social" (Gibson, 2016, p. 12).

Innovative technology can also help 21st century students engage with and learn about Shakespeare. For example, the game *Play the Knave* allows students to be represented by digital avatars that follow their body movements while they perform scenes from Shakespeare (Bloom, Kemp, Toothman, & Buswell, 2016). Several video games have been created based on the play *Hamlet* (Novitz, 2020). Digital storytelling

using stop-motion animation as well as online resources has also been recommended for students in primary classrooms learning about Shakespeare (Kucharczyk & Kucharczyk, 2022). Additionally, using the computer game Minecraft has been recommended to have students build a virtual world based on Shakespeare (Kucharcyzk & Kucharcyzk, 2022). Thus, innovative technology can be a tool to engage students with the author.

Scholarship has noted the connection between the communal experience of watching Shakespeare and the communal experience of virtual reality. Roberts-Smith (2021) notes "like Shakespeare, VR engages spectators in communal acts of meaning making. Rather than generating individualised experiences, it generates opportunities for the communal consideration of shared experiences" (p. 9). Harvey, Deuel, and Marlatt (2020) used virtual reality applications to show students in a classroom setting the Globe theatre where Shakespeare's works were performed. Thus, new technologies can allow opportunities for students to have a more interactive experience while learning Shakespearean works.

Virtual Reality and Student Motivation to Learn Shakespeare

Numerous studies have shown that motivation acts as a predictor of academic performance of students. Intrinsic motivation has been shown to correlate with objective academic performance and self-reported academic performance (Howard, Bureau, Guay, Chong & Ryan, 2021). Greater motivation also has an association with greater academic achievement among younger students (Broussard & Garrison, 2004). Cerasoli, Nicklin, and Ford (2014) showed that intrinsic motivation predicts academic performance and can be used in conjunction with external motivating factors.

Scholarship has demonstrated a growth of research focused on virtual reality and motivation from 1998 to 2018 (Soto, Navas-Parejo & Guerrero, 2020). Research shows that the usage of virtual reality applications is associated with higher motivation among research participants (Hsu, 2020; Stepan et al., 2017). Research has also demonstrated that virtual reality can be used to increase motivation among students when learning astronomy and that these effects can last over time (Huang, Roscoe, Johnson-Glenberg, & Craig, 2020). Research has also shown that students in a digital media department felt increased intrinsic motivation when creating 3-D paintings in virtual reality (Ho, Sun, & Tsai, 2019). Virtual reality can also be used to increase motivation of individuals with physical challenges engaging in post-stroke rehabilitation (Dias et al., 2019). Thus, virtual reality and motivation has been seen in a variety of contexts—including science, art, and physical training.

Scholarship has also discussed the use of virtual reality and Shakespeare to increase student motivation. Psotka (2013) identified that virtual reality can bring motivation and challenge to students while providing instruction concerning several topics, including the works of Shakespeare. Gibson argues that learners experience powerful motivation when they "make *Macbeth, Romeo and Juliet* or any other play their own, something that belongs to them, not to a cultural elite" (Gibson, 1998, p.12). Drawing on the work of Gibson, McInnis (2021) states that virtual reality can be used in a classroom to teach Shakespeare and improve motivation among students. He states that if virtual reality were used more in an educational context, "it would be on account of the fact that empowering students to explore Shakespeare for themselves is crucial and is something that VR is well-equipped to facilitate" (McInnis, 2021, p. 30).

Thus, research supports an increase in student motivation due to the use of virtual reality (Dias et al., 2019; Ho et al., 2019; Huang et al., 2020) and some scholars have discussed the power of virtual reality to increase student motivation in the context of Shakespeare specifically (McInnis, 2021; Psotka, 2013).

Virtual Reality and Student Engagement When Teaching Shakespeare

Student engagement has been shown to be associated with the use of virtual reality technology in an educational setting. Virtual reality has been associated with greater engagement among students (Liu, Wang, Lei, Wang, & Ren, 2020). Galvanic Skin Response Data has been used to measure participants' engagement when viewing a virtual reality performance with outcomes showing a greater level of engagement when compared to using a video screen (Kraj, Maranzatto, Geigel, Bailey, & Ovesdotter Alm, 2020). Student engagement has also been shown to be greater when using virtual reality when compared to a textbook for the students' learning experience (Allcoat & von Mühlenen, 2018).

Augmented reality technology has been used to promote student engagement in a classroom setting focused on the work of Shakespeare. Bryan (2021) noted the effect that this technology had on one of his students. When describing the use of augmented reality technology used in relation to a passage of Titania from *A Midsummer Night's Dream*, Bryan describes his student's written statement as

> 'Seeing all the objects mentioned in the text kind of brought it to life, and seeing it was really cool. I felt *like I was in the text* which helped me to understand it better.' Students seemed to experience the text in a different way, not necessarily

> more deeply thoughtful, but more 'engaged' or energised by what they could figure out from the passage. (Bryan, 2021, p. 38)

Bryan (2021) used smartphones to develop the augmented reality experience focused on *A Midsummer Night's Dream*. Another scholar noted that art students felt engaged during a project that included filming an immersive video relating to *The Tragedy of Julius Caesar* (McKinnis, 2021). Yet McKinnis (2021) leaves open the question whether their engagement necessarily came from taking advantage of properties of virtual reality. A performance of Shakespeare in virtual reality can also allow the user to walk around the space to experience different elements of the performance. One concept discussed is the body of Polonius being dragged by Hamlet while Claudius is organizing a group to search for the recently deceased (Ullyot, 2021). When discussing technology and Shakespeare with primary students, Kucharczyk and Kucharczyk (2022) noted:

> Just as virtual reality, multimodal stories, film and immersive computer gaming enhance how we enjoy stories today, playwrights in Shakespeare's era were experimenting with movable stages and even live cannon fire to enhance the visual spectacle…So, making use of technology to support how children understand, perform and respond to his plays is not just about making it relevant: it is authentically Shakespearean. (p. 29)

Thus, Shakespeare in virtual reality can provide students with a means of experiencing a work in innovative ways as well as being engaged in the learning process.

Social Presence

Social presence is a term that has been defined in different ways. First, this section of the literature review focuses on an operationalized definition of social presence. Scholarship on methods to increase social presence will be discussed next. Next, evidence that suggests that social presence is associated with greater academic achievement will be examined. Finally, different methods to measure social presence in the literature will be discussed.

Operationalized Definition of Social Presence

The concept of social presence as the construct describing how salient another individual is in mediated communication as well as the subsequent salience of their interactions was introduced in the 1970s (Rourke, Anderson, Garrison, & Archer, 2001; Short, Williams, & Christie, 1976). Social presence, along with teacher presence and cognitive presence, became part of the Community of Inquiry framework presented by Garrison, Anderson, and Archer (1999). However, the construct of social presence had some significant differences from its original conception.

In the Community of Inquiry model, social presence became more than the salience of individuals and their interaction in a mediated environment. In this Community of Inquiry model, the researchers defined social presence as "the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as 'real people'" (Garrison et al., 1999, p. 4). Emotional expression, open communication, and group cohesion were used as categories to measure social presence (Garrison et al., 1999). Later, social presence has also been defined in the context of the Community of Inquiry

model as the capacity of participants to identify with the group, communicate with purpose in an atmosphere of trust, and grow relationships with one another through the projection of their own respective personalities (Garrison, 2009).

To what extent the construct of social presence should refer to factors besides the salience of another individual and their interaction in a mediated environment has been discussed in the literature. Indeed, researchers have argued that the term social presence has been used to describe two different concepts: the extent of interpersonal relationships within the community and how real the other individual seems (Kreijns, Van Acker, Vermeulen, & Van Buuren, 2014). Discussing methods to assess social presence, one statement from the literature should be noted:

> A first problem is that it is not unequivocal what the instruments actually measure. In other words: What do the available instruments actually measure? Do they only measure social presence or do they also measure other variables such as attitude, cohesiveness, climate, feelings towards CMC, privacy, degree of interpersonal interaction, and so forth? (Kreijns et al., 2011, p. 370)

This study will consider both definitions of social presence. The construct of social presence as defined in the Community of Inquiry model provides information about group cohesion and cognitive affect (Garrison, 2009) while the older definition of social construct can still be useful when considering interpersonal interactions in an online environment (Kreijns et al., 2011).

Methods to Increase Social Presence

Evidence suggests that a focus on developing a community of students in online instruction is considered optimal by experts in the field (Martin, Ritzhaupt, Kumar, & Budhrani, 2019). In one study, Martin et al. (2019) interviewed award-winning online faculty about their perspectives of online instruction. All eight of the participants interviewed noted interaction or community as an important component in designing educational activities (Martin et al., 2019). One review of evaluation instruments for online instruction noted that most assessments included in their study were assessed for cooperation among students (Baldwin & Trespalacios, 2017). This study specifically examined online assessments in the context of high-quality principles for undergraduate education. Thus, both those who practice online instruction and those who study online instruction often believe that community is an important element.

Scholarship has recommended more research relating to K-12 learners as well as greater research on social characteristics of students (Simonson, Schlosser, & Orellana, 2011). Students' perception of online communication has been shown to have a correlation with student retention. As one article describes:

> Responses to CoI item #16 (*Online or web-based communication is an excellent medium for social interaction*.) account for over 18% of the variance associated with whether a student returned to studies in the semester subsequent to completing the survey. This is, simply stated, a remarkable finding, especially in light of the sample size obtained. (Boston, Díaz, Gibson, Ice, Richardson, and Swan, 2009, p. 77)

Some research has demonstrated that instructors can provide students with a greater sense of social presence with one another than in traditional in-person instruction (Alman, Frey, & Tomer, 2012; Wu, Hsieh, & Yang, 2017). Smaller cohort sizes have been demonstrated to be correlated with increased social presence (Akcaoglu & Lee, 2016). Within the context of massive open online courses, smaller courses are associated with greater social presence (Poquet et al., 2018). In a critique of social presence and the rapid increase in online instruction, the concept of participants working together in small remote groups was considered as a way of preserving some face-to-face contact (Rose, 2017). Research suggests that the size of the learning community in online instruction plays a role in the level of social presence (Akcaoglu & Lee, 2016).

Social Presence and Academic Achievement

Social presence—along with cognitive presence and teacher presence—are associated with greater academic achievement in an online setting (Rockinson-Szapkiw et al., 2016). Richardson et al. (2017) conducted meta-analysis research consisting of 26 studies using a variety of social presence measures. They found strong correlations between perceived learning and social presence as well as a strong correlation between learning satisfaction and social presence. The meta-analysis research of Martin, Wu, Wan, and Xie (2022) examined actual academic outcomes in relation to the Community of Inquiry model and found a positive correlation between social presence and actual academic performance. Research showing a correlation between social presence and academic success has also emphasized the role of the instructor as a facilitator in the online course (d'Alessio et al., 2019). However, not all past research has supported an association between social presence and academic achievement (Kožuh et al., 2015).

Priyadarshini and Bhaumik (2020) provided some evidence suggesting a connection between online learning and lack of social presence. Research has also suggested that decreased social connection may be a factor contributing to emotional challenges among students (Hawrilenko et al., 2021).

Methods to Measure Social Presence

Surveys and online interactions have been used to measure the construct of social presence. The Community of Inquiry survey may be one method of measuring social presence, but it is not the only method. Indeed, it is not even the only survey method which has been used to measure the construct (Arbaugh et al., 2008; Gunter, Braga, & Reeves, 2019; Keil & Johnson, 2002; Keles, 2018; Popescu & Badea, 2020; Short et al., 1976). This section first discusses survey methods for measuring social presence including semantic differential scales, the Social Presence Survey, the Community of Inquiry survey, and a newer scale focused on a narrower conception of social presence. After a review of survey methods, online interactions in an online course are described as an alternative method of measuring the construct.

Semantic differential scales. Decades ago, Short et al. (1976) proposed using pairs of words to measure social presence including personal-impersonal, sensitive-insensitive, warm-cold, and sociable-unsociable. Although Short et al. provided these semantic differential scales to measure the construct, no information about validation methods were provided (Kreijns, Bijker, & Weidlich, 2020). However, a questionnaire using the semantic differential scales Short et al. proposed has also been used to measure social presence (Keil & Johnson, 2002; Short et al., 1976).

Social Presence Survey. Short et al. (1976) discussed measuring social presence by using the work of Champness (1973). Later, Nowak and Biocca (2003) modified many of these same questions in their own research and developed the Social Presence Survey. Nowak and Biocca (2003) used a sliding scale to the nearest hundredth to assess participants' sense of feeling the presence of another individual in an online setting.

The Community of Inquiry survey. Evidence for the validity and the reliability of the Community of Inquiry survey has been presented in the research (Arbaugh et al., 2008; Stenbom, 2018). Before the Community of Inquiry survey, much research on the Community of Inquiry model was focused on content analysis. After the development of this survey, researchers have used this particular instrument in much of their research on teacher, social, and cognitive presence (Castellanos-Reyes, 2020). Factor analysis has suggested that the Community of Inquiry survey can be used as a measure of social presence as well as teacher and cognitive presence (Kozan & Richardson, 2014).

Five question measure of social presence. A new measure of social presence that would focus on the salience of the individual in an online setting rather than cohesiveness of the participants or their emotions was proposed at the beginning of the 2010s. The scale, used for this construct of social presence, is composed of five questions dealing with such factors as individuals having their communication partner in their mind's eye (Kreijns et al., 2011). The scale also focused on the similarity between having a discussion in a computer mediated setting when compared with an in-person conversation. Emotions and group cohesion are not factors in this measurement of social presence. Kreijns et al. (2011) point out that more research should be conducted on their

five-question scale; yet this survey demonstrated a high internal consistency as well as content validity.

Networked Minds Measure of Social Presence. Social Presence has also been measured using the Networked Minds Measure of Social Presence. The Networked Minds measure has been used in recent research focused on virtual reality (Barreda-Ángeles & Hartmann, 2022; Mackey, Bremner, & Guiliani, 2020). This scale measures various dimensions of social presence dealing with such factors as the allocation of the user's attention, the perception of understanding messages between individuals, and the perception of behavioral interdependence (Harms & Biocca, 2004). The scales in this measure of social presence have been shown to demonstrate concurrent validity (Biocca, Harms, & Gregg, 2001). Unlike social presence as defined in the context of the Community of Inquiry survey, social presence is not operationalized to contain elements such as the cohesiveness of the individuals interacting in the online environment.

Online interactions. Social presence has also been measured by interactions in an online learning environment—such as questions and comments by the teacher and the average amount of comments and likes (Keles, 2018). Online interactions among participants in an online class have been coded to measure social presence in the literature (Gunter et al., 2019). Research has demonstrated that online interactions through social media in a teacher development course can be analyzed through social presence as operationalized in the Community of Inquiry framework (Gunter, et al., 2019). Coding interactions for social presence have contributed to an argument that learning presence should also be considered in the Community of Inquiry framework (Blaine, 2019).

Virtual Reality

Alternative technologies — such as phones, tablets, virtual reality headsets, augmented reality glasses — may be methods used in academic settings to build an online community of learners. However, little research on virtual reality in education views it as an alternative medium of providing instruction (Kavanagh et al., 2017). While virtual reality options can be used for educational purposes, there is evidence both supporting and against its use in an educational context (Costea, Chirila, & Cretu, 2018; Saredakis et al., 2020). This section of the literature review provides an operationalized definition of virtual reality. Next, appropriate practices for using virtual reality in education will be discussed followed by arguments for and against use of virtual reality in education will be examined. Then, purposeful uses of virtual worlds are identified followed by what scholarship has reported on use of virtual reality on social presence. Finally, methods of studying virtual reality in education will be investigated.

Operationalized Definition of Virtual Reality

The research of Kardong-Edgren, Farra, Alinier, and Young (2019) have noted the differing definitions of virtual reality in the literature. Virtual reality has been defined in the literature as being a third dimensional setting produced by a computer which immerses the user (Kardong-Edgren et al., 2019; Lopreiato, 2016). Yet there are other definitions of virtual reality. Virtual reality has also been defined as an actual or simulated environment in which the user experiences telepresence (Kardong-Edgren et al., 2019; Steuer, 1992). This concept has also been defined as a display produced by a computer which permits or makes the individual(s) to have a feeling of being present in an environment that differs from their true location (Kardong-Edgren et al., 2019;

Schroeder, 1996). This concept also includes the element of the user interacting with the environment. Thus, there are multiple definitions of virtual reality in the literature, but most describe a third dimensional digital object or setting (Kavanagh et al., 2017).

Virtual reality has been described as creating an immersive simulated setting for the participant while augmented reality causes the viewer to see digital objects placed over the real world (Zhan, Yin, Xiong, He, & Wu, 2020). Girvan (2018) argued that virtual reality is a different concept than a virtual world as virtual reality immerses individuals in the virtual world.

Appropriate Practices for Using Virtual Reality in Education

Virtual reality can be used for games, simulations, and virtual worlds in education. All three are associated with educational attainment although games demonstrated the greatest level of educational attainment (Merchant, Goetz, Cifuentes, Keeney-Kennicutt, & Davis, 2014). Evidence suggests that virtual reality can increase educational attainment, although most research has focused on scientific topics (Hamilton, McKechie, Edgerton, & Wilson, 2020). This provides evidence for including both games and scientific topics in virtual reality instruction.

Research investigating listening comprehension in the context of virtual reality could also have significant implications for using virtual reality in reading instruction. Numerous researchers have examined virtual reality in the context of language learning (Garcia-Ruiz, Edwards, El-Seoud, & Aquino-Santos, 2008; Lee, 2019; Parmaxi, 2020). Noting a paucity of materials to help students improve in listening comprehension with few considering technological changes, Garcia-Ruiz et al. (2008) hypothesized virtual reality could be a method of helping students learn languages through collaboration.

Virtual reality has also been used to test listening proficiency in an academic context (Lee, 2019). However, most studies on virtual reality in the context of language learning deal with speaking with less focus on listening. In a comprehensive review of virtual reality literature, Parmaxi (2020) found none of the studies were specifically focused on reading and writing. Yet using virtual worlds has been associated with improved listening comprehension (Lan, 2015).

Evidence For and Against Virtual Reality in Education

Students have been shown to have a positive perception of using virtual reality in education (Holly, Pirker, Resch, Brettschuh, & Gütl, 2021; Ioannou & Ioannou, 2020). Students perceive various academic disciplines can be taught using technology (Costea, et al., 2018). Numerous academic disciplines have been taught using virtual reality, including anatomical education (Hackett & Proctor, 2016) and calculus (Goehle, 2018). Past research has suggested that experiences in virtual reality may alter students' perception of the non-virtual world (Katz & Halpern, 2015; Sample, 2020). Students engaged in virtual reality experiences demonstrated greater positive affect and retained more visual information when compared with augmented reality (Huang et al., 2019). However, students retained more auditory information in augmented reality (Huang et al., 2019).

Much research on virtual reality in education lacks research on virtual reality technology being used as an alternative medium of instruction for digital educational purposes (Kavanagh et al., 2017). Currently, there is little empirical support for using virtual reality in higher education to increase learning outcomes due to the gaps in the literature regarding these variables (Radianti, Majchrzak, Fromm, & Wohlgenannt 2020).

Numerous studies have also demonstrated physical sickness can occur when using virtual reality instruments depending on issues relating to vision, locomotion, and times of exposure (Saredakis et al., 2020).

Purposeful Use of Virtual Worlds

A virtual world refers to a shared space where individuals interact with one another and objects while using an avatar (Girvan, 2018). Virtual worlds have been discussed in the context of various academic fields—including psychology, business administration, and even epidemiology. Virtual worlds have been used in the context of psychology where use of virtual worlds has been used to help individuals overcome their fear of heights (Levy, Leboucher, Rautureau, & Jouvent, 2016). Additionally, using a virtual world has also helped people overcome their fear of flying (Rus-Calafell, Gutiérrez-Maldonado, Botella, & Baños, 2013). Virtual worlds have also been documented to increase psychological resilience (Paul, Mohanty, & Sengupta, 2022). Virtual worlds have also been studied in the context of business administration in relation to the customer experience (Flavián, Ibáñez-Sánchez, & Orús, 2019). A digital disease unintentionally released in a massive multiplayer game has been discussed as a way to learn about real world epidemics (Oultram, 2013).

Virtual worlds have also been used as a source of entertainment. Younger users in particular have been shown to use virtual worlds for entertainment purposes (Zhou, Jin, Vogel, Fang, & Chen, 2011). Virtual reality can be used for live music concerts, live sports games, amusement parks, museums, and other sources for entertainment (Tiwari & Damle, 2020). Research has suggested that friendship is a significant reason for participation in social virtual worlds (Hassouneh & Brengman, 2014).

Virtual Worlds and Social Presence

Research on virtual reality provides information regarding methods of increasing social presence, including the use of virtual worlds. Realism has been shown to be a factor in creating a sense of social presence for users (Hai, Jain, Wydra, Thalmann, & Thalmann, 2018; Zibrek & McDonnell, 2019). Indeed, research has demonstrated that interacting with a photorealistic animated character can elicit greater social presence than a more simplistic character (Zibrek & McDonnell, 2019). Realism in visual representation consists of photographic, anthropomorphic, and behavioral realism in the context of virtual reality (Harris, Bailenson, Nielsen, & Yee, 2009; Oh, Bailenson, & Welch, 2018). The more realistic the animated character, the more the character demonstrates photographic realism. The more human-like the animated character appears, the more the character demonstrates anthropomorphic realism. The greater the degree in which the character behaves like a human (blinking, shifting positions, breathing) the greater the character exhibits behavioral (or communicative) realism (Harris et al., 2009; Oh et al., 2018). Evidence suggests that behavioral realism is more important than photographic and anthropomorphic realism to creating social presence in virtual reality (Blascovich et al., 2002). In the words of researchers at the beginning of the twenty-first century, "cartoonists have known for decades that behavioral realism is more important than photographic realism in terms of social influence, devising compelling, behaviorally realistic, human-like characters whose cartoonish appearances (e.g., mice, ducks, pigs) are anything but photographically realistic" (Blascovich et al., 2002, p.112). A meta-analysis review by Oh et al. (2018) demonstrated a correlation between behavioral realism and social presence with less consistent results concerning

photographic and anthropomorphic realism (Oh et al., 2018). This suggests that photorealism may not be the most important realism for creating social presence in virtual reality.

Research has also suggested a notable role concerning the effect of social presence in the context of virtual reality. Social presence is highlighted in research for its role in predicting enjoyment of social virtual reality (Barreda-Ángeles & Hartmann, 2022). Research spanning multiple studies on social presence has demonstrated that a visual representation of another being (as opposed to a mere voice) increases social presence in a virtual environment while also noting the significant role of the characteristics of the user (Oh et al., 2018). However, this particular line of research focused on studies dealing with the salience of other computer-generated figures rather than group cohesion or affect.

Several studies have examined social presence of students in a virtual world while using the Community of Inquiry model (Burgess, Slate, Rojas-LeBouef, & LaPrairie, 2010; McClannon, Cheney, Bolt, & Terry, 2018; McKerlich & Anderson, 2007; McKerlich, Anderson, & Eastman, 2011; Pellas, 2017). The use of a virtual world has been used to promote social presence for students in the context of the Community of Inquiry model (McClannon et al., 2018). Using the Community of Inquiry framework, researchers have found that graduate students have demonstrated social presence using virtual worlds with a higher level of emotional expression when compared to group cohesion (Burgess et al., 2010). A correlation between social presence and teacher presence has been found among students participating in a virtual world (Pellas, 2017). Social presence has been documented through both open communication and the

cohesiveness of the group in a virtual environment (McKerlich & Anderson, 2007). The use of avatars and instant messaging has been studied in the context of the Community of Inquiry framework with positive results relating to social presence (McKerlich, et al., 2011).

Students from different academic levels and uses of software have been studied relating to virtual reality and the Community of Inquiry model. Graduate students have been the topic of some research (Burgess et al., 2010; McClannon et al., 2018). High school students have also been examined (Pellas, 2017). Adult students taking a higher education course have also been studied in terms of social presence when measured using the Community of Inquiry survey (McKerlich et al., 2011). As for the software, Second Life has been used (Burgess et al., 2010; McKerlich & Anderson, 2007) and OpenQwaq has been studied as an immersive environment (McClannon et al., 2018) as well as OpenSim (Pellas, 2017).

Methods for Studying Virtual Reality in Education

The scholarship reviewed used diverse measures for examining the impact of virtual reality in educational settings. This section examines quantitative, qualitative, and mixed-methods research on virtual reality in education and related topics (such as augmented reality and virtual worlds).

Quantitative methods. A pre-test and post-test design has been used to measure the academic growth of students using both virtual reality and augmented reality in an educational context (Liou, Yang, Chen, & Tarng, 2017). Much of the research focused on augmented, virtual, and mixed reality head-mounted displays for medical education is quantitative in nature. Often practical skill measurements and surveys were used in the

area of medical research (Barteit, Lanfermann, Bärnighausen, Neuhann, Beiersmann, 2021). Quantitative research demonstrated an effect of virtual reality in a science classroom. In one study of 90 students, students who participated in virtual reality demonstrated greater academic performance than students in a control group after adjusting the scores using ANCOVA (Liu et al., 2020). The mean adjusted post-test score of the experimental group stood at 0.713 while the mean adjusted control group score stood at 0.563. Another study of 40 students demonstrated the experimental group had a mean score of 73.85 while the control group had a mean score of 70.00 (Yang, Chen, Zheng, & Hwang, 2021). One meta-analysis of quantitative studies has shown that immersive virtual reality experiences demonstrate a greater effect size relating to academic performance when compared to semi-immersive or non-immersive experiences (Villena-Taranilla, Tirado-Olivares, Cózar-Gutiérrez, & González-Calero 2022). Thus, quantitative research suggests an effect of virtual reality on academic performance.

Qualitative methods. Class logs as well as formal and informal interviews have been used in an evaluative case study on virtual worlds (Dickey, 2003). It should be noted that it has been argued that the phrase "virtual reality" is not synonymous with "virtual world" although the two concepts are related (Girvan, 2018). A case study focused on virtual reality using semi-structured interviews examined an intervention focused on teaching history (Yildirim, Elban, & Yildirim, 2018). Virtual reality has also been used as a setting in which an interviewer and an interviewee can meet for "go-along interviewing" (Vindenes & Wasson, 2021, p. 1).

Mixed-methods. A questionnaire providing quantitative information on student perceptions of a virtual world experience combined with videos and transcripts has also

been used in mixed-methods research on virtual worlds in education (Wu, Lan, Huang, & Lin, 2019). Mixed-methods research has also used the Presence Questionnaire and the Agent Value Questionnaire when examining a virtual world experience and social presence (Krassmann, Nunes, Bessa, Tarouco, & Bercht, 2019). Virtual reality has been studied using mixed methods research in a chemistry lab to understand phenomena beyond academic performance (Gungor et al., 2022).

Theoretical Framework

This section references topics underpinning elements of this research and their alignment with values of theoretical perspectives. This section begins with a discussion of the constructivism learning theory. This section examines how the Community of Inquiry model and the values of post-positivism support the methods used in this mixed method research.

Constructivism Learning Theory

Social presence has been viewed through a constructivist lens, yet different scholars define constructivism in different ways in the research literature (Amineh & Asl, 2015). Constructivism has been used as "an umbrella term for a wide range of ideas drawn primarily from…developments in cognitive psychology" (Robinson, Molenda, & Rezabek, 2008, p. 32). Vygotsky developed social constructivism and emphasized the importance of social influences on the child (Robinson et al., 2008, p. 32). Driscoll (2005) notes that constructivist learning theories see learning as being constructed in the context of student experience. Swan, Garrison, and Richardson (2009) argue the Community of Inquiry framework is consistent with a constructivist model of learning.

The Community of Inquiry model is a major part of this research in studying the impact of a virtual reality technological innovation on social presence.

Community of Inquiry framework. This research draws upon the Community of Inquiry framework for one of its measures of social presence. In a book chapter on The Community of Inquiry framework co-written by one of the creators of the Community of Inquiry model, the framework is described in the context of the work of John Dewey's conception of education and collaborative constructivism (Swan et al., 2009). The book chapter notes the importance of the social element of learning before tracing the history of social presence. Even before the Community of Inquiry model, John Dewey played an important philosophical role in the history of educational technology. Edgar Dale (1946) noted the significance of John Dewey's ideas on concept formation before elaborating on various audio and visual methods to provide students with an education based on experiences. Dale's research further served an important role in the field of educational technology (Januszewski & Molenda, 2008).

The Community of Inquiry framework is consistent with a view that "the communication context created through familiarity, skills, motivation, organizational commitment, activities, and length of time in using the media directly influence the social presence that develops" (Garrison et al., 1999, p. 13). Garrison et al. (1999) state that past researchers put too much emphasis on the impact of media rather than the context of communication relating to these factors. For Garrison et al., social presence can create a community of collaboration among students that can be contrasted with the concept of downloading information in an online learning environment. It has been argued that the core of the Community of Inquiry model represents a collaborative constructivist view

(Swan et al., 2009). Students learning within virtual worlds have been studied through the lens of the Community of Inquiry framework in past research (Burgess et al., 2010; McClannon et al., 2018; McKerlich & Anderson, 2007; McKerlich et al., 2011; Pellas, 2017).

Post-positivist framework. This research study is also aligned with certain values associated with a post-positivist framework due to its use of the scientific method (Creswell & Báez, 2020). Dewey (1997), a firm supporter of the scientific method, argues in the 1938 book *Experience and Education* "scientific method is the only authentic means at our command for getting at the significance of our everyday experiences of the world in which we live" (p. 88). This researcher believes that the scientific method is important and will use quantitative and qualitative means to learn about the student's knowledge of Shakespearean works and social presence indicators when implementing a virtual reality technological innovation with students from a variety of educational backgrounds. Even if the technological innovation outcomes support growth in the student's knowledge of Shakespearean works as well as high social presence indicators, future research could challenge these findings. This attitude toward the findings of the study is consistent with a post-positivist theoretical framework for research (Creswell & Báez, 2020).

Chapter Summary

This study seeks to add to the research on use of virtual reality in academic settings. This literature review examined the connection between student's knowledge of Shakespearean works, social presence, and the state of virtual reality instruction with twenty-first century learners. Discussed were various issues relating to teaching

Shakespeare in this era, including how the use of film (Cohen, 2018; Dakin, 2009; Gibson, 2016), social interaction (Cohen, 2018; Gibson, 2016), digital storytelling (Kucharczyk & Kucharczyk, 2022) and virtual worlds (Girvan, 2018) have been recommended as means to teach students about Shakespearean literature. Research has also noted that virtual reality can play a role in promoting student motivation (Huang et al., 2020; Psotka, 2013; Soto et al., 2020). Scholar practitioners have also stated in virtual reality Shakespearean scholarship that student engagement arose from the use of augmented reality and immersive filming in their pedagogy (Bryan, 2021; McInnis, 2021).

This literature review discussed the evolution of the concept of social presence. Emerging in the 1970s, the concept of social presence first referred to the salience of individuals and their communication in technologically mediated environments (Rourke et al., 2001; Short et al., 1976). However, the term as used in the Community of Inquiry framework takes into account other factors beyond this narrow definition (Garrison, 2009; Kreijns et al., 2011). Evidence also suggests that increased social presence may be associated with increased learning in an academic context (Richardson et al., 2017; Rockinson-Szapkiw et al., 2016). This underscores the importance of seeking solutions to increase social presence when using virtual reality technology.

The literature review discussed evidence that virtual reality can be purposively used across diverse educational context (Costea et al., 2018; Goehle, 2018; Hackett & Proctor, 2016; Holly et al., 2021; Huang et al., 2019; Ioannou & Ioannou, 2020). Applications of virtual worlds and their influence on social presence indicators using the

Community of Inquiry framework was discussed (Burgess et al., 2010; McClannon et al., 2018; McKerlich & Anderson, 2007; McKerlich et al., 2011; Pellas, 2017).

The literature review also identified quantitative, qualitative, and mixed-methods methods used for studying virtual reality in educational settings as well as social presence (Dickey, 2003; Krassmann et al., 2019; Liou et al., 2017; Wu et al., 2019) in supporting how mixed-methods research can draw from the corpus of literature when making decisions about appropriate measurements of this topic. The constructivist theoretical framework that supports the Community of Inquiry model and the values of a post-positivist framework help provide context for this research on the implementation of virtual reality technology and social presence.

CHAPTER 3

METHODS

The purpose of this mixed methods study is to implement and evaluate the impact of a virtual reality technological innovation on students' knowledge of Shakespearean works and social presence indicators when participating in virtual worlds relating to four works of Shakespeare. The research questions that guide this study are 1) How does the implementation of a virtual reality technological innovation affect students' knowledge of Shakespearean works? and 2) How does the implementation of a virtual reality technological innovation affect social presence in students? First, the research design used in this study will be described. Next, the setting and participants will be discussed with a special emphasis on the virtual worlds used as the setting of this study. The innovation will then be described before the method of data collection is outlined. After focusing on how the data will be analyzed, the procedures and timeline will be described. Steps to increase the rigor and trustworthiness of the research will be noted before a description of the plan for sharing findings.

Research Design

Due to its examination of the relationship between quantitative and qualitative mixed methods design, this research is aligned with the values of convergent mixed methods design (Creswell & Plano Clark, 2011, as cited in Creswell & Clark, 2017). Mixed methods research is characterized by its use of both quantitative and

qualitative data. In the words of Schoonenboom and Johnson (2017) "The overall goal of mixed methods research, of combining qualitative and quantitative research components, is to expand and strengthen a study's conclusions and, therefore, contribute to the published literature" (p. 110). Although historical accounts of mixed methods research often cite the work of Campbell and Fiske in the 1950s (1959; as cited in Maxwell, 2016) when discussing the origins of the field, it has been argued that using both quantitative and qualitative findings to draw conclusions can be traced earlier to the astronomical research of Galileo. Indeed, using both quantitative and qualitative aspects in research has been documented even in the 1800s and early 1900s (Maxwell, 2016).

Mixed method design was a fitting methodology for this research. Mixed method research design provided this dissertation with both the advantages of quantitative and qualitative research. Mixed method research can provide a means to assess the effects of an intervention while also enhancing experiments by integrating the views of individuals (Creswell & Creswell, 2014). Thus, the individual perspectives of students' knowledge about Shakespearean works and their social presence can be evaluated from quantitative data on these topics. Scholarship on the topic has argued that using triangulation can allow those doing mixed methods research to gain increased assurance of their results (Jick, 1979). Mixed method design also provides precedent for analysis of the quantitative and qualitative data through triangulation (Denzin, 1978, as cited by Jick, 1979).

A convergent mixed methods design aligned with the procedures, data collection, and data analysis in this research. According to scholarship on the topic, both qualitative and quantitative data are accumulated and examined in this design (Creswell & Plano

Clark, 2011, as cited in Creswell & Clark, 2017). These two kinds of data are then combined and compared with one another to present an interpretation of the results. The mixed method design provided a framework in relation to social presence as well as provided a structure for the procedures of this research of collecting both quantitative and qualitative data and then conducting an analysis.

The intersection between quantitative and qualitative findings were discussed when analyzing the results of this research to answer the research questions guiding this study. One issue that mixed-methods research can explore is whether the quantitative and qualitative results converge or diverge (Creswell & Creswell, 2017). Areas of discourse were also identified when interpreting the outcomes of the data. Use of inductive analysis as a discovery process for seeing themes in qualitative data collected allowed the students' perceptions of the virtual reality experiences to be considered.

Participants and Setting

Students participated from a variety of educational backgrounds. This study is an example of convenience sampling (Obilor, 2023). This researcher reached out to personal connections to recruit for this study. Some of these personal connections also reached out to others. This researcher also recruited by creating a post on a social media page relating to homeschooled students. A charter school also assisted in recruiting. Three of the students attended the traditional public school system in Orangeburg County while other students were homeschooled. These students in this study had the opportunity to connect with students from other locations as well. Thus, this research provided a means for people with educational experiences in different areas of South Carolina to learn together. See Table 3.1 for the range of prior educational experiences the students

brought to the research. The age of students in the table refers to the age put on the initial sign-up form in October. The sessions began in November.

Table 3.1 *Student Information*

	Male	Female	Total
Gender	5	4	9
Age: 13	3	0	3
14	0	2	3
15	1	2	3
8th grade	4	2	6
9th grade	1	0	1
10th grade	0	2	2
Traditional Public School Student	0	3	3
Charter School Background	2	0	2
Homeschooled	3	1	4

After enrolling in this study to be a part of the virtual reality book club, students were provided Quest 2 virtual reality headsets by the researcher for use during the intervention. One student, however, ended up using a Quest 2 virtual reality headset that had been provided to the family before the start of this research. The students used these headsets when engaging in the virtual book club sessions. Parental consent forms (see Appendix A) and participant assent forms were sent virtually. Parents provided electronic signatures representing their permission to participate in this study. Both student e-mails

and parent e-mails were used to communicate. Although students were able to use the virtual reality headset for the duration of the study, there were no monetary or grade incentives for being a research participant. The sessions took place at around the same after-school time each week. One make-up session was also conducted.

This study offered students the opportunity to have an academic and social experience while learning at home. The structure of the virtual book club session began with a videoconferencing call led by the researcher. After this brief videoconferencing introduction, the students had the opportunity to use the virtual reality headsets to enter the virtual worlds. Students met up in virtual worlds using two different virtual reality applications, Bigscreen and VRChat (Bigscreenvr.com; Vrchat.com). For some sessions, the students logged onto VRChat while other sessions the students logged onto Bigscreen. Using the application VRChat, students experienced virtual worlds relating to the content of the Shakespearean plays. When engaged in virtual worlds using the virtual reality application Bigscreen, the students experienced watching animated scenes of Shakespeare's plays on a large screen. This room also contained a sofa, carpets, and a coffee table.

The setting of this research was the virtual worlds that students visited during their engagement with the virtual reality book club. Virtual reality provides the immersion of the user within the virtual world (Girvan, 2018). During the virtual reality experiences, the students were provided with opportunities to talk to one another and to the researcher while engaged in the virtual worlds. For several sessions, students met up in the same virtual reality farm before visiting other worlds. This farm contained fruit trees, flowers, corn fields, red barns, and scarecrows. In this world, an individual could

look up in the sky and see moving clouds while hearing birds chirping. Leaves could also be seen floating in the wind.

Once all students were connected, the researcher opened different portals for students to explore together. For example, the Pantheon of Rome was one of the virtual worlds students had the opportunity to visit. In this setting, students could observe towering columns, a fountain, and an amphitheater. Students also had the opportunity to visit Herod's Temple. An individual could climb stairs and see a menorah. Students also had the opportunity to visit a cathedral with Renaissance paintings and a chancel before them. Within the virtual worlds, students also spoke to one another and the researcher about the works being studied. Students explored these areas and experienced virtual worlds which connected to the settings of Shakespeare's works. Some of the worlds illustrated the era of the work being studied. For example, the Pantheon helped students learn more about Ancient Rome. Ancient Rome is the setting of *The Tragedy of Julius Caesar*. By visiting a virtual cathedral inspired by architecture of the fifteenth century, students could learn more about the era of Shakespeare's play *Richard III*.

By using virtual reality, students had the opportunity to visit a variety of virtual worlds relating to the content discussed in the virtual reality book club sessions (see Table 3.2).

Table 3.2 *Virtual Worlds and Academic Content*

Julius Caesar Sessions	Macbeth Sessions	Hamlet Sessions	Richard III
Farm	Farm	Farm	Farm
The Pantheon	Throne Room	Temple of Herod	Cathedral
Theater	Theater	Cemetery	Throne Room
		Victorian House	Theater
		Theater	

Innovation

This intervention provided social and academic experiences to students participating in a virtual reality book club. The students visited a total of eight separate virtual worlds related to the content of the Shakespearean works being studied. The innovation is the use of these virtual worlds to establish social presence while engaging in an educational context. Students also watched performances of a live actor and scenes from the Shakespearean content delivered in virtual reality. The live actor used an avatar in order to communicate to the students in the virtual worlds. This live actor had previous experience acting in plays and films. He also had experience working as a radio announcer. This underscores the acting and media arts background of the live actor who participated in the research. He used a virtual reality headset for most of his performances, but also used a personal computer as well. First, evidence for the use of virtual reality is discussed. Next, the first two weeks that focused on *The Tragedy of Julius Caesar* sessions are described followed by the next two week's sessions on *Macbeth* are detailed. Lastly, two weeks of *Hamlet* sessions are described followed by an explanation of the two weeks of *Richard III* sessions. See Appendix B for Shakesperean monologues studied in the virtual reality book club.

Virtual Reality

Research suggests that virtual reality is associated with academic performance (Hamilton, McKechie, Edgerton, & Wilson, 2020; Merchant et al., 2014). Researchers have also found a relationship between social presence and the constructs of relatedness and enjoyment in the context of social virtual reality settings (Barreda-Ángeles &

Hartmann, 2022). Evidence also suggests that virtual reality can increase student motivation to learn (Huang, et al., 2020; Sattar et al., 2019) and higher student motivation is associated with greater academic outcomes (Toste, Didion, Peng, Filderman, & McClelland, 2020). Virtual reality can be seen as serving the same intellectual goals as prior developments in audio-visual media. In a text highlighting the importance of audio-visual materials in the classroom, Dale (1946) notes "The use of a wide variety of teaching aids in the school enables education to be more concrete–and therefore to build better abstractions" (p. 36). When students were in proximity to the researcher within the virtual world, their voices were captured. Students could also express emotions using emojis when using VRChat ("Action Menu," n.d.) and they could also express themselves through avatar gestures in both VRChat and Bigscreen.

Students visited numerous virtual worlds using the technology of virtual reality. Students could communicate with one another and the teacher while using avatars in the virtual worlds. The students used verbal communication during the study. The teacher and the students could also gesture to one another by using the Quest 2 controllers. Students could also move their head in different directions to view different areas of the virtual worlds. Students could use their avatars to move in the virtual worlds and explore the various learning settings. The teacher asked numerous questions during this study while in virtual reality. Questions focused on such concepts as the virtual worlds, the historical setting of the work, and specific lines of the texts being studied. See Table 3.3 for a sample of some of the many questions that students were asked within the virtual worlds.

Table 3.3 *Sample of Questions Asked within Virtual Reality*

Sessions	Questions
Julius Caesar Sessions	And he said, "The fault is not in our stars, dear Brutus, but in ourselves." What do you think that might mean? "The fault is not in our stars, dear Brutus, but in ourselves." What do you think? So what do you think Cassius is saying to Brutus there? Any thoughts?
Macbeth Sessions	What do you guys think Macbeth means by "Out, out brief candle" after he found out his wife died? So what are some lessons that you think you can take with you in your own life to help you lead a better one?
Hamlet Sessions	What do you think would be a big influence on people in Shakespeare's time? So what do you guys think of that speech? Any thoughts?
Richard III Sessions	"A horse, a horse! My kingdom for a horse!" What do you think it means? So do you think these people who lived in the ancient world, the Middle Ages, and the early modern era made very different choices, it'd be a totally different world now?

Students engaged in discussions with one another and the teacher within various virtual worlds. The teacher led the students at times to different areas of the virtual worlds but also provided time for students to explore the worlds with one another. The

virtual world of the cathedral provided students with numerous opportunities to engage in dialogue. Individuals in this world could climb stairs and stand on a balcony. From this angle, a student could see the pews below them as well as numerous stained-glass windows. Students had the opportunity to visit a throne room with a purple carpet leading to a large throne as well as a graveyard with rows of graves and dancing skeletons. Students also had the opportunity to converse with one another in a Victorian house. This house contained traditional furniture, fireplaces, lit candles, stairs, and red curtains.

Each visit to the theater contained an opportunity for students to watch animated scenes of Shakespeare's works. Students accessed the virtual theater by using the application Bigscreen. The researcher also presented visual art based on Shakespeare as well as written text. For example, students were shown the painting *Hamlet and Horatio in the Graveyard* by Eugène Delacroix (Delacroix, 1835). Students were also shown Benjamin West's painting *Hamlet: Act IV, Scene V (Ophelia and Laertes)* (Google Arts & Culture, n.d.). Various other pieces of art were shown to students as well. Students were also provided time to discuss the texts with one another.

Julius Caesar Sessions

In the first *Julius Caesar* session, students used virtual reality headsets to visit the farm. The teacher taught students about life before the Industrial Revolution. The teacher then created a portal in this virtual world. By walking through the portal, the students and the teacher were able to visit the Pantheon. In order to provide instruction relating to *The Tragedy of Julius Caesar*, the teacher asked students their thoughts relating to a statue that stood near the entrance of a building. By communicating with the students within the virtual world, the teacher elicited a discussion about historical information relating to the

work. The teacher and the students discussed both Julius and Augustus Caesar within the virtual world. The students then left the statue and walked toward the amphitheater. The teacher discussed the character of Cassius in *The Tragedy of Julius Caesar*. The live actor made his first appearance in the virtual reality book club. Students watched the live actor while they were on the seats of the amphitheater. A sword floated in the air near the live actor. After the actor's performance, the teacher asked what the students thought about the performance. The teacher and the students discussed the lines of Cassius. Throughout this session, the teacher gave the students time to talk to one another within the virtual worlds. A make-up session was conducted which also included the visit to the farm, the trip to the Pantheon, and the live actor's Shakespearean performance. Both writing prompts and a multiple-choice question were provided after the end of the experiences.

In the second *Julius Caesar* session, students entered the theater as avatars. Students engaged in discussions relating to animated scenes of *Julius Caesar* shown on a large screen. During this session, the live actor again appeared before the students. This time the actor wore a red suit with a red tie and he had a red eyepatch on. He recited lines of Cassius. The teacher then commented that they had studied Cassius speaking to Brutus before and inquired from the students if any parts stood out. Additionally, the teacher asked what Cassius was trying to get Brutus to do. The students discussed characters in the work. At the teacher's prompting, the students discussed whether it was choice or destiny that defined their lives. Thus, this session contained scenes from the Shakesperean work, a monologue by a live actor, and time to discuss the works. Students were provided writing prompts and a multiple-choice question after the session.

Macbeth Sessions

In the first *Macbeth* session, students again returned to the farm. Early in the session, students gathered at a picnic by a large tree with a hammock while others were at a picnic by a hedge maze. However, later the students by the large tree also joined the students by the hedge maze. The teacher discussed the transition from the Roman Empire to the Middle Ages. The students discussed this era with the teacher. The teacher then opened a portal that allowed participants to access the throne room. In the throne room, the live actor appeared again and walked toward the throne. The teacher provided background information relating to the actor's upcoming performance. The teacher noted that the actor's words would be what Macbeth said after the death of his wife. The live actor acted a Shakesperean performance in the virtual world. The teacher split the students into two different groups. One group of students gathered near a table with different delicacies. The other group of students were in a group closer to the throne. The teacher shared the phrase "Out, out, brief candle" with both groups and the students shared their thoughts on the meaning of the phrase during this session.

In the second *Macbeth* session, students met in the theater and watched scenes from the work. The instructor asked again about the phrase "Out, out brief candle' which elicited a discussion between the students. The teacher provided background information about *Macbeth* and the Middle Ages, including that one of the individuals in the work would become the ancestor of the king of England. After watching portions of *Macbeth*, the teacher and the students discussed the play together. Later in the session the students and the teacher discussed the character of Lady Macbeth. The teacher also asked the significance of the quote "What's done cannot be undone" from the work and the

students engaged in a discussion. Later in the session, the teacher asked students about lessons students can take from the work to lead a better life. Thus, the second *Macbeth* session contained animated scenes from Shakespeare in the theater and time for discussion of the work. Students were provided writing prompts and a multiple-choice question after the session.

Hamlet Sessions

In the first *Hamlet* session, the students started by returning to the virtual farm. The teacher created a portal by a corn field and took students to Herod's Temple. The teacher gave historical information about Herod and the students were given the opportunity to explore the Temple of Herod. Later the students gathered by several columns where the teacher asked what book would be important in Shakespeare's time. The teacher discussed sources that influenced individuals in the era. Next, the teacher created a portal near a large door at the Temple of Herod. The students walked into the portal and found themselves in a graveyard with dancing skeletons. The students were split into two groups by the teacher. Some of the students gathered within a crypt while others stood outside the gate of the graveyard. The teacher went to both groups and provided information on *Hamlet.*

Later in the session the live actor walked through the gate and walked near the back of the graveyard. The instructor gave background information on the character of Yorick in *Hamlet* to the students. The actor stood in the graveyard and did a Shakesperean performance in virtual reality. After the live actor's performance, the instructor offered a link to a portal so that students could visit a Victorian house. The students gathered near a fireplace and a rug. In this world, the teacher taught students

about the influence of Shakespeare on future generations. The actor again appeared in the Victorian house. This time he stood by a table with silverware near a bookshelf and provided a performance from Hamlet. In the second *Hamlet* session, students visited the theater and viewed art based off the Shakesperean text. Students also watched scenes from the work and engaged in discussions. Students were provided with writing prompts and a multiple-choice question after each session.

Richard III Sessions

In the first *Richard III* session, the students gathered in the virtual reality farm for the final time. The teacher created a portal to visit a cathedral. While standing outside the cathedral at night, the teacher and the students discussed the values of the Renaissance. The teacher also asked the students their opinions on the steeple. The teacher noted that the architecture of the cathedral was based off architecture of the fifteenth century. The students discussed thoughts on connections between architecture and religion. The students and the teacher then entered the cathedral. The teacher asked students for their thoughts on the art seen within the cathedral. Students discussed their opinions before exploring the cathedral further. The teacher later split students into two groups that looked at various paintings. Students shared their thoughts on the art before them with the teacher. The teacher then opened a portal to the throne room where the students came back together. The students gathered near the throne and the teacher stood before them and recited the line "A horse! A horse! My kingdom for a horse!" The teacher asked students why someone would want to trade their kingdom for a horse. Students shared their thoughts. In the final *Richard III* session, students were shown art based off the Shakesperean work, *Richard III*. Students also looked at written text from the work. The

teacher asked students to recite lines of Richard III from the text. Additionally, students watched scenes about Richard III and engaged in discussions based off prompting by the teacher. Lastly, students were provided with a multiple-choice question and writing prompts.

Data Collection

Multiple quantitative and qualitative data sources were used to answer the research questions of this study. The Shakespeare Knowledge Assessment, student interviews, writing prompts, and weekly multiple-choice questions were used to examine evidence relating to the first research question relating to the students' knowledge of Shakespearean works. The Community of Inquiry Survey, the adapted version of Networked Minds Social Presence Measure, the Social Presence Survey, student interviews, and writing prompts were used to examine evidence relating to the research question relating to the social presence of students. The quantitative data sources discussed in this section are the Shakespeare Knowledge Assessment, the Community of Inquiry Survey, the adapted version of Networked Minds Social Presence measure, and the Social Presence Survey. The qualitative data sources discussed in this section are the student interviews and writing prompts. See Table 3.4 for the alignment between the research questions of this study and the data collection sources used.

Quantitative Data Sources

Shakespeare Knowledge Assessment. A summative assessment has been described as a tool to summarize educational attainment which can include testing (Earle, 2019). A test has been defined as "a formal set of questions or tasks, often administered

Table 3.4 *Alignment of Research Questions with Data Sources*

Research Questions	Data Sources
1. How does the implementation of a virtual reality technological innovation affect students' knowledge of Shakespearean works?	• Shakespeare Knowledge Assessment • Participant Interviews • Writing Prompts • Multiple-Choice Questions
2. How does the implementation of a virtual reality technological innovation affect social presence in students?	• Community of Inquiry Survey • Adapted Version of Networked Social Presence Measure • Social Presence Survey • Participant Interviews • Writing Prompts

to a group of students that address particular cognitive capabilities learned in a specific course or subject area" (Mertler, 2016, p. 7). The Shakespeare Knowledge Assessment is an example of a test that measures concepts related to the consent content covered in the virtual reality book club (see Appendix C). Scholarship has noted that summative assessments can be used to provide information on student learning to various stakeholders–including parents, other instructors, and the leadership of a school (Earle, 2019). Scholarship has noted that academic performance has been measured using student grades on assignments or in the course (York, Gibson, & Rankin, 2015). Past research has used teacher-created assessments in the context of researching student achievement (Finch, 2016). For this study, students completed the Shakespeare Knowledge Assessment, which was distributed through digital means, using questions from an academic website on the subject (myshakespeare.com, n.d.) as well as questions created by this researcher. The Shakespeare Knowledge Assessment contains ten

multiple-choice questions that focus on specific passages from *Hamlet* (four questions), *The Tragedy of Julius Caesar* (three questions), *Macbeth* (one question), and *Richard III* (two questions). This researcher created the two questions that pertain to specific passages from *Richard III*. However, one of these questions was not included in the final analysis due to an error in the answer choices. An Orangeburg County School District teacher with experience providing English Language Arts instruction reviewed the Shakespeare Knowledge Assessment and provided positive feedback relating to its use and the appropriateness of a middle or high school English class studying Shakespeare curriculum. The Shakespeare Knowledge Assessment was provided to students near the beginning of the virtual book club sessions and again after the last session. Students completed the Shakespeare Knowledge Assessment in their homes by clicking on a link sent by the teacher. Since this was done through electronic means, the teacher could see which choice the student had selected. The teacher used these responses to determine the scores of students. See Appendix D for permission granted in using questions from the myshakespeare.com website.

Surveys. According to scholarship, survey designs can provide researchers with numerical way to state the attitudes of a population (Creswell & Creswell, 2017). Surveys can be used to ask participants questions and then analyze their responses. This data can be used to generate statistics on a study population. Using surveys has been used to study a wide range of phenomena–including the rate of unemployment, income, health conditions, crime, agriculture, and worker satisfaction (Fowler, 2013). The Community of Inquiry Survey, an adapted version of the Networked Minds Social Presence measure, and the Social Presence Survey were used to describe the social phenomena of the

students in the context of the virtual reality book club. These three surveys were distributed through digital means and the responses were retained by the digital source hosting the surveys. See Table 3.5 for an overview of the objective of each survey used in this study.

Table 3.5 *Objectives of Surveys*

Survey	Objective
Community of Inquiry Survey	This survey measures the extent of open communication, cohesion of group, and level of emotional/personality projection (Arbaugh et al., 2008)
Networked Minds Social Presence Measure	This tool measures perceptions of mutual awareness, mutual attention, and understanding of communication and emotion. This tool also perceptions of emotional comprehension and interrelationship of behaviors (Harms & Biocca, 2004).
Social Presence Survey	This survey measures whether a participant views the medium as being able to promote social interaction. Measures whether the participant found another to be "real" as well as the extent a participant feels they were in the room with another participant (Nowak & Biocca, 2003).

Community of Inquiry Survey. Students were given the Social Presence section of the Community of Inquiry Survey (see Appendix E) to assess their affective expression, open communication, and group cohesion within the virtual world (Arbaugh et al., 2008). Each of the three Social Presence subscales contained three statements, respectively. The students responded to each statement using a five-point Likert-scale where 1 = "Strongly Disagree" to 5 = "Strongly Agree". The social presence category of

the Community of Inquiry Survey has been demonstrated to have a Cronbach's alpha of 0.91 (Arbaugh et al., 2008). Other research has shown a Cronbach's alpha of 0.93 for the social presence section with internal reliability of 0.86 for affective expression, 0.94 for open communication, and 0.87 for group cohesion (Heilporn & Lakhal, 2020). Examples of statements include "Getting to know other course participants gave me a sense of belonging in this course" and "I was able to form distinct impressions of some course participants."

Networked Minds Social Presence Measure. An adapted version of the Networked Minds Social Presence measure (Harms & Biocca, 2004) was used to further inquire about the students' perceptions of social presence occurring in the virtual reality book club setting (see Appendix F). The items used in this version of the Networked Minds Social Presence measure contained five different factors each with good internal consistency: Co-presence (a = 0.83), Perceived Affective Understanding Attentional Allocation (a = 0.81), Perceived Message Understanding (a = 0.87), Perceived Emotional Interdependence (a = 0.85), and Perceived Behavioral Interdependence (a = 0.82). See Table 3.6 for the definitions of each construct and how those constructs relate to social presence. The Networked Minds Social Presence measure uses a 7-point Likert scale for the participants to respond where 1 = "Strongly Disagree" to 7 = "Strongly Agree". Most of the questions for this study have been altered to reflect the situation of the students in virtual reality. The wording has been changed from "my partner" to reflect the presence of multiple students. For example, "My presence was obvious to other virtual reality book club participants" or "I remained focused on other virtual reality book club participants throughout our interactions." (See Appendix D for information relating to

correspondence with and permission from Dr. Chad Harms.) The adapted version of the Networked Minds Social Presence measure was provided to students after the last virtual reality meeting of the virtual reality book club.

Table 3.6 *Networked Minds Social Presence Measure with Definitions*

Networked Minds Social Presence Measure	Definitions
Co-presence	Co-presence refers to the extent an individual perceives themselves to be with another individual. Co-presence also refers to the extent in which an individual achieves a level of awareness of another. This construct also refers to the level the individual believes another person has achieved awareness of that individual.
Attentional Allocation	Attentional Allocation refers to the level of attention the individual provides to another. This concept also includes the degree the individual is the recipient of attention from another.
Perceived Message Understanding	Perceived Message Understanding refers to the level the individual senses that another individual comprehends their own message. This construct also includes the degree to which an individual believes they are cognizant of another's message.
Perceived Affective Understanding	Perceived Affective Understanding is characterized by the capability of the individual to recognize the emotions and attitudes of another. This construct is also defined by the individual's assessment of the degree others are aware of the individual's emotions and attitudes.

Perceived Behavioral Interdependence	Perceived Behavioral Interdependence refers to the degree by which one's behavior is influenced by another's actions. This concept is also characterized by the level that another's behavior is impacted by the other person

Note: Harms, C., & Biocca, F. (2004). Internal consistency and reliability of the networked minds social presence measure. In M. Alcaniz & B. Rey (Eds.), Seventh Annual International Workshop: Presence 2004. Valencia: Universidad Politecnica de Valencia.

***Social Presence Survey*.** The Social Presence Survey is based on the work of Nowak and Biocca (2003) who cite Short et al. (1976). Short et al. (1976) cited unpublished research by Champness (1973) when discussing questions used to assess social presence. The six questions by Nowak and Biocca had variations from the questions discussed by Short et al. The retained six questions were found to have good internal consistency and reliability for their measure of social presence ($a = 0.82$). In accordance with the research practice of Nowak and Biocca, students in this study used their mouse to place their response on a sliding scale to the nearest hundredth on a scale of 0 to 1. A response closer to 0 reflected a strong, positive response as opposed to a response closer to 1 reflected a strong, negative response. This study used the measure of social presence described by Nowak and Biocca with some variations in wording to consider multiple students rather than a single partner. The wording was also changed to reflect other aspects of the virtual reality book club intervention. In this study, four questions of the Social Presence Survey (see Appendix G) were asked including statements such as "To what extent was this virtual reality experience like you were in the same room with other participants?" or "To what extent did other participants seem

"real" while engaged in this virtual reality experience". See Appendix D for information relating to correspondence with Williams regarding their permission to use this measure.

Qualitative Data Sources

Qualitative information can offer insight into participant responses on surveys (McCusker & Gunaydin, 2015). Student interviews and writing prompts provided an opportunity for students to explain some of their thoughts on social presence and the academic elements of this study.

Student interviews. Using interviews has a long history in social science research (Sieber, 1973). Interviewing can provide an opportunity for a participant to provide their own viewpoint while also allowing the interviewer to ask follow-up questions (Creswell & Báez, 2020). These student interview questions (see Appendix H) examined their perspectives about the use of the virtual reality technological innovation on their knowledge of Shakespeare and how they perceived social presence attributes to be experienced. Table 3.7 identifies the list of twelve questions used for student interviews and their alignment with each of the research questions in this study. In regard to the second research question, Table 3.7 also includes the alignment between the social presence factors found on the Networked Minds Social Presence Scale and the student interview questions.

The student interviews took around fifteen to twenty minutes each and were conducted using Zoom web-conferencing software. The interviews were recorded through Zoom and transcribed with the assistance of software.

Table 3.7 *Alignment of Research Questions with the Participant Interview Questions*

Research Questions	Interview Questions
1. How does the implementation of a virtual reality technological innovation affect students' knowledge of Shakespearean works?	1. Share with me examples of how visiting the throne room and the theater helped you understand the setting and characters of Macbeth. a. Follow up: if they only mention one virtual world room, ask specifically about the other virtual world room? 2. Describe examples of how experiencing the Pantheon and the theater helped you learn about the setting and characters of *The Tragedy of Julius Caesar*. a. Follow up: if they only mention one virtual world room, ask specifically about the other virtual world room? 3. Share examples of how visiting the Temple of Herod, the Cemetery, and the theater helped you gain knowledge of *Hamlet.* a. Follow up: If each virtual world room is not mentioned, ask specifically about the other virtual world room(s)? 4. Discuss examples of how your time in the throne room, the cathedral, and the theater helped you understand the era and events of *Richard III*. a. Follow up: If each virtual world room is not mentioned, ask specifically about the other virtual world room(s)?

2. How does the implementation of a virtual reality technological innovation affect social presence in students?	5. Share with me a couple examples that best describe your overall experience in the virtual reality book club? 6. Share examples when your avatar's behavior was in response to the behavior of another person's avatar within virtual reality. *(Perceived Behavioral Interdependence)* 7. Conversely, describe examples when you felt another participant's avatar exhibited behaviors in reaction to your own avatar's behavior. *(Perceived Behavioral Interdependence)* 8. Describe examples when other book club participants' avatars caught your attention within the virtual worlds. *(Co-presence)* 9. Offer situations when another participant's avatar influenced your own emotional response when within the virtual worlds. *(Perceived Emotional Interdependence)* Follow up: emotional responses can be positive (joy, excitement, intrigue) or negative (anger, frustration, disappointment). 10. Identify examples when it was both easy as well as difficult to understand what other participants were saying when in the virtual worlds. *(Perceived Message Understanding)* Follow up: How often did you feel the other participants understood what you were trying to communicate when in the virtual worlds? Explain.

	11. Describe examples where you felt you could understand how other participants felt when engaged in virtual reality. (*Perceived Affective Understanding*)
	12. Share with me examples when you focused on another participant's avatar within the virtual worlds. *(Perceived Affective Understanding)*

Writing prompts. Past educational research has also included participant reflections (Domingo & Bradley, 2018). The writing prompts used in this research asked about social presence in the virtual reality atmosphere (see Table 3.8). Students were asked to respond to the weekly writing prompts the evening after their engagement with a virtual book club session. These writing prompts could be completed with a computer. Questions from Harms and Biocca (2004) were used to create the social presence questions used in the writing prompt. The student's interview responses related to the outcomes of the adapted version of the Networked Minds Social Presence Scale, as writing prompts were crafted by this researcher with the five social presence subscales in mind: Co-Presence, Perceived Affective Understanding Affectional Allocation, Perceived Message Understanding, Perceived Affective Emotional Understanding, and Perceived Emotional Behavioral Understanding Interdependence (Harms & Biocca, 2004; see Appendix I).

Table 3.8 *Writing Prompts, Weekly Multiple-choice Questions, Shakespearean Work Covered, and the Virtual World*

Week and Shakespearean Work Covered	Shakespearean Knowledge Question	Writing Prompt (**Social Presence Indicator*)	Virtual World
Week 1 Julius Caesar	In *The Tragedy of Julius Caesar,* Cassius attempts to convince Brutus to _____. a. Surrender to Caesar **b. Betray Caesar** c. Dine with Caesar d. Declare war on Caesar's forces	1. Describe a situation when another participant's avatar caught your attention at the pantheon. *(Co-presence)* 2. Offer an example when you were at the pantheon discussing the speech of Cassius and another participant's thoughts were communicated clearly to you. (*Perceived Message Understanding)*	Farm The Pantheon
Week 2 Julius Caesar	Mark Antony contributes to turmoil in Rome by defending the deceased _____ in a speech to his fellow Romans. a. Cassius b. Brutus c. Casca **d. Caesar**	1. Share examples when you believe you could understand the emotions displayed by another participant's avatar while discussing *The Tragedy of Julius Caesar* in the theater. *(Perceived Affective Understanding)*	Theater

		2. Describe a time when you were in the theater discussing *The Tragedy of Julius Caesar* and the attitude expressed by another participant's avatar influenced how you felt. (*Perceived Emotional Interdependence)*	
Week 3 Macbeth	Macbeth uses the concept of a candle going out after the death of… **a) Lady Macbeth** b) Macduff c) Banquo d) Malcolm	1. Describe a situation after watching the performance from *Macbeth* when your avatar's behavior was in response to another participant's avatar's behavior. *(Perceived Behavioral Interdependence)* 2. Offer some examples when another participant's avatar's behavior seemed as though it was a response to your own avatar's action in the throne room. (*Perceived Behavioral Interdependence)*	Farm Throne Room

Week 4 Macbeth	What is the outcome of the war between Macbeth and Macduff? a. Lady Macbeth becomes Queen of Scotland **b. Macbeth is defeated** c. Macduff is defeated due to his hubris d. Both Macbeth and Macduff lose their lives in a final showdown	1. Describe a time when your avatar's behavior was closely tied to another participant's avatar at the theater when discussing *Macbeth (Perceived Behavioral Interdependence)* 2. Share an example when you thought another participant found it easy to understand you while at the theater. (*Perceived Message Understanding)*	Theater
Week 5 Hamlet	What is Hamlet's attitude toward Yorick? a. He is pleased that his plot for revenge has succeeded **b. He remembers the joy that Yorick brought him years ago** c. He wonders whether the skull is authentic or if this is but a plot of the king d. He is haunted by the nightmares of Yorick that he experiences at night	1. Describe a situation when another participant's avatar caught your attention at the Temple of Herod. *(Co-presence)* 2. Share detailed examples of how other participants' thoughts were clear to you at the cemetery. (*Perceived Message Understanding)*	Farm Temple of Herod Cemetery Victorian House

Week 6 Hamlet	What happens to Queen Gertrude? a. She leaves the kingdom due to escape the reign of the king b. She ends up killed by Polonius **c. She ends up drinking poison** d. She rules Denmark upon the death of her son, Hamlet	1. Share an example when your avatar's behavior was in response to another participant's avatar while in the theater. (*Perceived Behavioral Interdependence*) 2. Describe a situation when another participant's avatar's behavior was a response to your own avatar's actions while at the theater. (*Perceived Behavioral Interdependence)*	Theater
Week 7 Richard III	In the play *Richard III* by William Shakespeare, the main character is motivated by… **a. Personal ambition** b. Goodwill and charity c. Self-sacrifice d. Revenge for the death of his father	1. Write examples where you felt you could accurately describe how another participant was feeling while at the cathedral. *(Perceived Affective Understanding)* 2. Provide an in-depth response detailing when another participant's avatar's attitude influenced how you felt while at the cathedral. *(Perceived*	Farm Cathedral Throne Room

		Emotional Interdependence)	
Week 8 Richard III	Which of the following individuals survives in Richard III? a) George, Duke of Clarence b) Lord Hastings c) Richard III **d) Henry of Richmond**	1. Discuss a situation when another participant's avatar caught your attention at the theater. *(Co-presence)* *2.* Write examples where you felt you could accurately describe how another participant was thinking when discussing *Richard III. (Perceived Message Understanding)*	Theater

Data Analysis

This research using the virtual reality technological innovation draws from both quantitative and qualitative data sources to gain a better understanding of the social presence indicators and knowledge of Shakespearean works of virtual reality book club participants (see Table 3.9). An argument has been made that the application of mixed method research "allows respective strengths and weaknesses of each approach to complement each other" (Regnault, Willgoss, & Barbic, 2018, p. 2). Scholarship has noted that mixed methods research is encouraged due to the strengths and weaknesses of qualitative and quantitative methods (Kimmons, 2022). Quantitative analysis methods were used for the pre- and post-Shakespeare Knowledge Assessment, the Community of

Inquiry Survey, the adapted version of Networked Minds Social Presence measure, and the Social Presence Survey. Qualitative analysis methods will be used for the student interviews and the writing prompts. A mixed method design also provides precedent for analysis of the quantitative and qualitative data through triangulation (Denzin, 1978, as cited by Jick, 1979).

Table 3.9 *Research Questions, Data Sources, and Data Analysis Alignment*

Research Questions	Data Sources	Data Analysis
1. How does the implementation of a virtual reality technological innovation affect students' knowledge of Shakespearean works?	• Shakespeare Knowledge Assessment • Participant Interviews • Multiple-Choice Questions • Writing Prompts	• Descriptive Statistics • Wilcoxon Signed-Rank Test • Inductive Analysis
2. How does the implementation of a virtual reality technological innovation affect social presence in students?	• Community of Inquiry Survey • Adapted Version of Networked Social Presence Measure • Social Presence Survey • Participant Interviews • Writing Prompts	• Descriptive Statistics • Inductive Analysis

It has also been argued that a disadvantage of mixed method research is that the phrase is used to categorize studies that combine methods in a superficial manner (McMillan & Schumacher, 2006, as cited in Cameron, 2011). However, this research will take advantage of having both sets of data and analyzing the connection between quantitative and qualitative in a thoughtful manner.

Quantitative Data Analysis

Shakespeare Knowledge Assessment. For quantitative analysis of the Shakespeare Knowledge Assessment, I used a pre- and post-assessment to measure participant Shakespearean knowledge growth. Descriptive statistics were used in order to identify measures of central tendency. A Wilcoxon signed-rank test was used to determine if statistical significance was found ($a < 0.5$) when analyzing the pre- and post-scores on the Shakespeare Knowledge Assessment. Past scholarship has discussed the role of descriptive statistics in statistical analysis (Creswell & Creswell, 2017).

Multiple-Choice Questions. Descriptive statistics were used in order to analyze the results of the weekly multiple-choice questions provided with the writing prompts. Scholars have discussed the use of descriptive statistics in previous work (Creswell & Creswell, 2017). These findings helped reveal information about Shakesperean knowledge students learned through participation in virtual reality book club sessions.

Surveys. Three instruments measuring for social presence (Community of Inquiry Survey, adapted version of Networked Minds Measure of Social Presence, Social Presence Survey) were completed by the participants after the last virtual book club meeting. Descriptive statistics were used to describe the results of the three measures of social presence. Descriptive statistics were also used to analyze the results of a survey to describe characteristics common to the entire sample (Mertens, 2020). These statistics were used to understand the social phenomenon of participants learning in virtual reality.

Qualitative Data Analysis

Two sources of qualitative data were analyzed, the participant interviews and writing prompts. Participant interviews were recorded using videoconferencing software.

Using video recording has been recommended in the literature concerning qualitative analysis (Saldaña & Omasta, 2016). Appropriate transcription software assisted with transcribing the recordings. However, transcription of an interview can still require time and effort (Kuckartz & Rädiker, 2019). I reviewed and became familiar with the transcripts before inductive analysis begins.

Each of the participants' responses to the weekly writing prompts completed were compiled into one data file. I combined the writing prompt data file and the interview transcripts into one large file for the qualitative analysis process. The interview recordings were transcribed as well as reviewed for accuracy. I began the process of inductive analysis by using initial coding (which has also been described as "open coding") after reviewing and familiarizing myself with the transcripts of interviews and other qualitative data captured (Saldaña, 2016, p.115). I engaged in pattern coding to organize the information while also ascribing meaning to the data. This second cycle of coding led to the emergence of categories. The categories were reduced into three themes (Saldaña, 2016). This qualitative data analysis outcomes shed light on social and academic characteristics of participants within the context of their participation in a virtual reality book club.

Procedures and Timeline

Virtual reality headsets were used by a group of students from a variety of educational backgrounds who volunteered to participate in a virtual reality book club that met after school hours from their homes. The intent of the research was to contribute to the existing literature in measuring how social presence is experienced when engaged in virtual reality experiences. This study included four separate phases (see Table 3.10). In

Table 3.10 *Procedures and Timeline*

Phase	Activity
Phase 1: Participant Preparation	1. University of South Carolina eIRB approval 2. Research Sign Up 3. Consent and Assent Forms E-mailed 4. Headsets Delivered
Phase 2: Data Collection	1. Virtual Reality Book Club Meetings, Writing Prompts, and Multiple-Choice Questions 2. Shakespeare Knowledge Assessment 3. Community of Inquiry Survey 4. Adapted version of Networked Minds Measure of Social Presence 5. Social Presence Survey 6. Participant Interviews
Phase 3: Data Analysis	1. Descriptive Statistics 2. Inferential Statistics 3. Inductive Analysis
Phase 4: Communication of Findings	1. Email to parents and participants with research findings and links to an informational session 2. Video conference meeting with stakeholders 3. Presentation of results to relevant parties

the first phase, Participant Preparation, IRB approval was obtained from the University of South Carolina on September 1st, 2022 (see Appendix J). The researcher also e-mailed parental consent forms and student assent forms. After parental consent forms were signed through electronic means, students were provided virtual reality headsets. The researcher used the postal service in order to help students receive headsets for this study. One student used a headset that the researcher had provided their family before they

began their participation in this research. In the second phase, Data Collection, students attended weekly virtual reality book club meetings and the researcher collected data. After Data Collection came the third phase, Data Analysis. In this phase, a variety of methods were used to analyze both quantitative and qualitative data. The fourth phase—Communication of the Study—includes making resources of the study available to my dissertation committee members, the students of this study, and other relevant parties. This phase is ongoing. These phases followed a similar structure to past research in the field of education (Owens, 2020).

Phase 1: Participant Preparation

In this first phase students and parents were provided with information about the research followed by the researcher providing electronic parental consent and student participation assent forms (see Appendix A). The researcher provided Quest 2 virtual reality headsets to participants. Some headsets were mailed while the researcher had provided one family with the headset before their participation in this research. The virtual reality book club provided a way for students to socialize with one another from their homes. Student participation in the virtual reality book club is consistent with the concept of a New Rural Society using telecommunications as a means to improve employment and educational opportunities in rural areas (Goldmark, 1972; Hughes, 2016).

Phase 2: Data Collection

The virtual reality book club met on Thursdays from about 6:00pm to 8:00pm for a series of eight sessions. In these sessions, students utilized virtual reality headsets to engage in dialogue within virtual worlds related to the Shakespeare works being studied.

Video recordings captured student discussions, avatar selection, and avatar movements within the virtual space. Although these video recordings were not transcribed for the qualitative data, they assisted the researcher in describing the intervention. Most of the students electronically completed the Shakespeare Knowledge Assessment before their first session with all students completing it before the second week's session. The researcher sent a link to students in order to access the writing prompts and the multiple-choice questions.

At the end of the eighth virtual reality book club meeting, the students again completed the Shakespeare Knowledge Assessment, as well as the Community of Inquiry survey, the adapted version of the Networked Social Presence measure, and the Social Presence Survey. During the week following the last virtual reality book club meeting, individual student interviews were conducted via videoconferencing.

Phase 3: Data Analysis

First, descriptive statistics and parametric statistics (Mertens, 2020) were used to examine the pre and post results from the Shakespeare Knowledge Assessment. Descriptive statistics were used to analyze the Community of Inquiry Survey, the adapted version of Networked Minds Measure of Social Presence, and the Social Presence Survey. Second, I transcribed student interviews and read them for accuracy. Both interview data and writing prompts were compiled into a single resource. Third, student interviews and writing prompts were coded through inductive analysis. Lastly, emergent themes of the qualitative data were converged with statistical results of the quantitative data.

Phase 4: Communicating Findings

My dissertation research was presented to my dissertation committee. I plan to share the results with students of this study and their families, as well as other stakeholders. I plan to communicate the findings of the study through a videoconference as well as a link to presentation documenting highlights of the results. I also plan to share findings from this research at an academic conference.

Rigor and Trustworthiness

This study provided background data, detailed description of phenomena, triangulation of sources, and peer debriefing to examine evidence for rigor and trustworthiness.

Provision of Background Data and Detailed Descriptions of Phenomena

Evidence can also be collected for the potential transferability of research findings by providing background data (Shenton, 2004). This background data consisted of information relating to the home location and educational settings of the students being studied, the number of students in the research, the methods for collecting data, and the time frame in which the study took place. This background data can be found within Chapter 3, the methodology section.

The use of thick description has been defended within academic literature (Scheff, 1986). For the student interviews, I gathered data that provided greater context of the virtual reality fieldwork to provide evidence for transferability. This aligns with recommendations by Shenton (2004) concerning the significance of detailed descriptions to provide evidence for transferability. To further provide evidence for transferability, the

interview questions used helped explain the situation of the student within the virtual reality settings of this study. The outcomes from the data collected could provide guidance on potential transferability of the methods used in this study to further provide insight on social presence of students within virtual reality.

The virtual book club meetings also provided information which can be used in considering the transferability of the research situation. I discussed the virtual environments that students participated in as well as the avatars students used. I discussed both the dialogue and actions of students within the virtual environment. Thus, providing detail on the virtual environment fits in with recommendations from the literature and provides additional support for transferability (Shenton, 2004).

Triangulation of Sources

Examining various sources of data using the same method has been defined as triangulation of sources (Patton, 1999). Triangulation supports credibility of the research (Shenton, 2004). By using several quantitative and qualitative data collection methods, this researcher could examine the results independently as well as in comparison of each. The transcripts of the student interviews and the responses of writing prompts were combined as a method of triangulation of the qualitative data. Combining multiple methods of research practices has been discussed to counter the limits of various approaches (Brewer & Hunter, 1989). The three quantitative data sources relating to social presence were used in order to better understand the student experience. Ultimately, the convergence of the quantitative data analysis outcomes with the themes that emerged from the inductive analysis of the qualitative data sources supports the use of triangulation in answering the two research questions of this study. Thus, I gained

greater insight into the phenomenon at hand by considering the results of both methods and comparing them to one another (Mertens, 2020). This offered a fuller picture of the results and provided evidence to assess the role of virtual reality on social and academic characteristics of students.

Peer Debriefing

This research also included peer debriefing to gain alternative outlooks on the research from a professional perspective. A peer debriefer asks questions about the research to add validity to the study (Creswell & Creswell, 2017). The dissertation chairs of this work, Dr. Tammi D. Kolski and Dr. Fatih Ari, acted as peer debriefers for the purpose of this study. These professors work at the University of South Carolina and have a background in the field of educational technology. Furthermore, peer debriefing should include conversation with the peer about a study's findings, conclusions, analysis, and hypotheses (Mertens, 2020). These four elements were significant topics of discussion for regular peer debriefing sessions. My dissertation committee members also added rigor to my research. Having my study questioned and reviewed by my dissertation committee members allowed for multiple researcher perspectives to be addressed and identified flaws in the study design to be solved prior to its completion (Shenton, 2004).

Plan for Sharing and Communicating Findings

This research sought to investigate the effects of virtual reality on students' Shakespeare knowledge and social presence. An online presentation will be offered for students and their families outlining major findings from the research. After the presentation concludes, students will have the opportunity to participate in a question-and-answer session and be given a form in which they can share feedback. A presentation

will also be e-mailed to parents explaining the research and findings. Past research has stressed the challenges that can occur when anonymizing interview data (Saunders, Kitzinger, & Kitzinger, 2015). The writing of this study and presentations delivered used pseudonyms of individuals when reporting qualitative data (Creswell & Creswell, 2017).

After sharing the findings with the students and their families, I will hold another online meeting and invite other stakeholders from relevant school settings to share and discuss the findings. Students who wish to attend may also do so as some may wish to discuss their perspective with relevant stakeholders. I hope to share the results of the research at the national level by presenting my findings of the research to members of relevant organizations.

CHAPTER 4

ANALYSIS AND FINDINGS

The purpose of this mixed methods study was to implement and evaluate the impact of a virtual reality technological innovation on students' knowledge of Shakespearean works and social presence indicators when participating in virtual worlds relating to four works of Shakespeare. Both quantitative (the Shakespeare Knowledge Assessment, multiple-choice questions, the Community of Inquiry survey, the adapted version of Networked Minds Social Presence measure, and the Social Presence Survey) and qualitative data (student interviews and writing prompts) were collected and analyzed.

This research is consistent with the values of a convergent mixed methods design (Creswell & Plano Clark, 2011, as cited in Creswell & Clark, 2017). This study answered the following research questions: 1) How does the implementation of virtual reality technological innovation affect student's knowledge of Shakespearean works? and 2) How does the implementation of a virtual reality technological innovation affect social presence in students?

Quantitative Findings

Each of the nine participants also completed three different quantitative measures relating to social presence. Each participant completed an assessment based on the social presence from the Community of Inquiry survey with slight variations (Arbaugh et al.,

2008). Participants also completed an adapted version of the Networked Minds Social Presence measure (Harms & Biocca, 2004). Participants also completed a version of a social presence survey adapted from the work of Nowak and Biocca (2003). This work cited Short et al. (1976) which cites work by Champness (1973). Thus, quantitative results relating to three different measures of social presence can be described. Table 4.1 shows the pre-assessment and post-assessment results of the Shakespeare Knowledge Assessment.

Table 4.1 *Students' Correct Responses on the Shakespeare Knowledge Assessment and Descriptive Statistics*

Student	Pre-Assessment Correct Responses	Post-Assessment Correct Responses
Kyle	3/9	6/9
Chris	3/9	5/9
Jamie	2/9	4/9
Alex	2/9	6/9
Shawn	2/9	2/9
Jordan	2/9	3/9
Carsen	7/9	5/9
Taylor	5/9	6/9
Jessie	4/9	6/9
Mean (SD)	3.33(1.73)	4.78(1.49)

Students tended to demonstrate growth on their Shakespeare Knowledge Assessment. By question, Table 4.2 shows the percentage of correct answers given by the students. The students' pre-survey and post-survey results ranged from 11.11% to 77.77%. Questions 7 and 8, both regarding passages from *Hamlet,* were answered

correctly by most students on both the pre-assessment and the post-assessment: Question 7 (pre-assessment 77.77%, post-assessment, 88.88%) and Question 8 (pre-assessment 66.66%, post-assessment, 66.66%). On the pre-assessment, Questions 1 and 5 (passages from *Julius Caesar* and *Macbeth*, respectively) were answered most often incorrectly (11.11%). On the post-assessment, Question 1, Question 3, and Question 9 were those most often answered incorrectly (22.22%). The mean percentage of questions answered correctly by students on the pre-assessment was 37.04%. The mean percentage of questions answered correctly by students on the post-assessment was 53.08%. The students' knowledge of Shakespeare's work improved, as evidenced by the percentage of questions answered correctly. The scores increased by an average of 16.04 from the pre-assessment (M = 37.04) to the post-assessment (M = 53.08).

Table 4.2 *Percentage of Correct Answers by Question*

Question (Related Text)	Percent Correct Pre-Assessment	Percent Correct Post-Assessment
Question #1: (Julius Caesar)	11.11%	22.22%
Question #2: (Hamlet)	33.33%	77.77%
Question #3: (Julius Caesar)	22.22%	22.22%
Question #4: (Julius Caesar)	55.55%	55.55%
Question #5: (Macbeth)	11.11%	55.55%
Question #6: (Hamlet)	22.22%	66.66%
Question #7: (Hamlet)	77.77%	88.88%
Question #8: (Hamlet)	66.66%	66.66%
Question #9: (Richard III)	33.33%	22.22%

Inferential Statistics. Inferential statistics began by conducting the Shapiro-Wilk test, as this test was a common procedure to check for normality within a set of data (Razali & Wah, 2011). Results from the Shapiro-Wilk normality test (Razali & Wah, 2011; Shapiro & Wilk, 1965) suggested the pre-assessment data deviated from a normal distribution ($p = .03$). In addition, the post-assessment data also suggested a deviation from normality ($p = .05$). Combined with there being nine participants in this study, a Wilcoxon Signed Rank test was conducted to analyze the pre-assessment and post-assessment medians of the Shakespeare Knowledge Assessment. The results showed no statistical significance ($p < .07$, $W = 4.50$).

Multiple-Choice Questions

Multiple-Choice Questions were included in this study as a formative assessment to monitor student's knowledge of Shakespearean works being studied each week. Evidence suggests that formative assessments might do a better job measuring English Language Arts as opposed to mathematics (Kingston & Nash, 2011). Each form with the open-ended writing prompts distributed at the end of the virtual book club session contained one multiple-choice question relating to the Shakespearean work being studied that week.

Reliability. To assess the reliability, or internal consistency, of students answering correctly the weekly question, the Cronbach's alpha was calculated (Tavakol & Dennick, 2011). The Cronbach's alpha score revealed there to be acceptable reliability of the data ($\alpha = .80$).

Descriptive Statistics. Descriptive statistics were used to provide simple summaries about the sample and the measures (Creswell & Creswell, 2017). About five

students answered correctly on average (M = 5.13, SD = 2.47) with a range of students answering correctly from 1 to 8. The percentage of students who answered correctly each week ranged from 20% (week 8 studying *Richard III*) to 100% (week 4, studying *Macbeth*). Table 4.3 shows the students who answered correctly on the weekly multiple-choice question.

Table 4.3 *Students Answering Correctly the Weekly Multiple-Choice Question.*

Week	Shakespearean Work Covered	Number of students who answered correctly	Percentage of students who answered correctly	Number of students who returned the writing prompt
Week 1	Julius Caesar	7	88%	8
Week 2	Julius Caesar	2	29%	7
Week 3	Macbeth	6	67%	9
Week 4	Macbeth	8	100%	8
Week 5	Hamlet	7	77%	9
Week 6	Hamlet	5	71%	7
Week 7	Richard III	5	63%	8
Week 8	Richard III	1	20%	5

Community of Inquiry Survey

Only the Social Presence section of the Community of Inquiry Survey (Arbaugh et al., 2008) was given to the students. This survey contains nine statements relating to three different social presence indicators–affective expression, open communication, and group cohesion. The Social Presence section of the Community of Inquiry Survey consisted of nine questions with students responding to statements on a five-point Likert scale (1 = “Strongly Disagree” to 5 = “Strongly Agree”). All nine students completed the

Social Presence section of the Community of Inquiry Survey at the end of the intervention.

Reliability. To assess the reliability, or internal consistency, of students' responses on the Social Presence section of the Community of Inquiry Survey, the Cronbach's alpha (Tavakol & Dennick, 2011) was calculated. The Cronbach's alpha reliability coefficient (Cronbach, 1951) is used to measure the reliability or internal consistency of a survey. The Cronbach's alpha score revealed there to be poor reliability of the survey data ($\alpha = .56$). Interpretation of the data should therefore be viewed with caution.

Descriptive Statistics. Descriptive statistics can be used as a means to analyze survey results (Glewwe & Levin, 2005). Table 4.4 shows the descriptive statistics for the full Community of Inquiry Survey as well as each of the three indicators. Overall, the mean score for the Social Presence section of the Community of Inquiry Survey was 4.12 ($SD = 0.83$).

Table 4.4 *Descriptive Statistics for the Social Presence Section of the Community of Inquiry Survey*

Social Presence Section of the Community of Inquiry Survey	*M*	*SD*
Full Survey	4.12	0.83
Affective Expression Indicator	4.04	0.71
Open Communication Indicator	4.37	0.84
Group Cohesion Indicator	3.96	0.90

Affective expression. Affective expression is the first indicator on the Social Presence section of the Community of Inquiry survey (Boston et al., 2009). The mean score of student responses for three affective expression indicator statements was 4.04

(*SD* = 0.71). The minimum response was a 2 and the maximum response was a 5. The first statement "Getting to know other course participants gave me a sense of belonging in this course" had a mean score of 4.11 (*SD* = 1.05). A score of 4.11 reveals that students tended to agree with this statement. Likewise, the third statement "Online or web-based communication is an excellent medium for social interaction" had a mean score of 4.11 (*SD* = 0.60). This suggests that participants also tended to agree with this sentiment. The second statement "I was able to form distinct impressions of some course participants" had a mean score of 3.89 (*SD* = 0.33). A score of 3.89 suggests that students tended to express their agreement with this statement as well. However, this score suggests a greater level of neutrality when compared to the responses to the other two items noted here.

***Open communication*.** Open communication is the second indicator on the Social Presence section of the Community of Inquiry survey (Boston et al., 2009). The mean score of student responses for three open communication indicator statements was 4.37 (*SD* = 0.84). The minimum response was a 2 and the maximum response was a 5. The first statement "I felt comfortable conversing through the online medium" had a mean score of 4.56 (*SD* = 0.73). Thus, students tended to agree or strongly agree with this sentiment. The third statement "I felt comfortable participating in the course discussions" had a mean score of 4.33 (*SD* = 0.87). Therefore, this score reveals that the virtual reality book club participants tended to agree with this statement as well. The open communication indicator had the greatest mean score of the three indicator categories within the construct of social presence. This suggests students tended to show high agreement regarding computer-mediated discourse.

Group cohesion. Group cohesion is the third indicator on the Social Presence section of the Community of Inquiry survey (Boston et al., 2009). The mean score of student responses for three group cohesion indicator statements was 3.96 (*SD* = 0.90). The minimum response was a 2 and the maximum response was a 5. The third statement "Online discussions helps me to develop a sense of collaboration" had a mean score of 4.11 (*SD* = 0.93). This provides evidence that the virtual reality book club participants tended to agree with this assertion. The second statement "I felt that my point of view was acknowledged by other course participants" had a mean score of 3.78 (*SD* = 0.83). Although this score is not as high as the previous score discussed, it still reveals that students tended to agree with the statement. The group cohesion indicator had the lowest mean score of the three indicator categories within the construct of social presence. However, the mean score of 3.96 still provides evidence for group cohesion with the virtual reality book club.

Network Minds Social Presence Measure

All nine students completed a modified version of the Networked Minds Social Presence measure (Harms & Biocca, 2004) at the end of the study's intervention. The Networked Minds Social Presence measure was used to capture the students' perceptions of social presence occurring while engaged in the virtual reality book club setting. The Networked Minds Social Presence measure consisted of 36 statements and the students responded to each statement using a 7-point Likert scale (1 = "Strongly Disagree" to 7 = "Strongly Agree"). There were six subscales of the Networked Minds Social Presence measure used in this study: Co-Presence (6 statements), Attentional Allocation (6 statements), Perceived Message Understanding (6 statements), Perceived Affective

Understanding (6 statements), Perceived Emotional Interdependence (6 statements), and Perceived Behavioral Interdependence (6 statements).

Reliability. Cronbach's alpha can be used to measure the reliability of questions on surveys (Santos, 1999). The importance of examining the reliability of items in surveys has been discussed in the literature (Hajjar, 2018). The Cronbach's alpha (Cronbach, 1978*)* was calculated to measure the reliability, also referred to as internal consistency, for the complete Networked Minds Social Presence measure as well as each of the six subscales (see Table 4.5). The Cronbach's alpha score revealed acceptable reliability of the full Networked Minds Social Presence measure overall (α = .87).

Table 4.5 *Descriptive Statistics for the Networked Minds Social Presence Measure*

Networked Minds Social Presence Measure	*M*	*SD*	α
Full Measure	4.84	1.55	0.87
Co-Presence Subscale	5.80	0.98	0.57
Attentional Allocation Subscale	4.35	1.58	0.08
Perceived Message Understanding	5.51	1.31	0.47
Perceived Affective Understanding	4.48	1.38	0.55
Perceived Emotional Interdependence	4.74	1.59	0.95
Perceived Behavioral Interdependence	4.17	1.67	0.97

The interpretation of several of the subscales should be done with caution. Among the six subscales, the internal consistency varied from unacceptable reliability of the Attentional Allocation subscale (α = .08) to excellent reliability on both the Perceived Emotional

Understanding subscale (α = .95) and the Perceived Behavioral Understanding subscale (α = .97).

Descriptive Statistics. Descriptive statistics have been utilized in research to show survey data (So, Lossman, & Jacobson, 2009). Table 4.5 shows the descriptive statistics for the full Networked Minds Social Presence measure as well as each of the six subscales. The mean score of student responses for the full Networked Minds Social Presence measure was 4.84 (*SD* = 1.55). This quantitative measure provided evidence for student perceptions of social presence occurring within the virtual world settings to be in slight agreement.

Co-Presence. The Co-Presence subscale of the Networked Minds Social Presence measure speaks to the participants' perception of mutual awareness and sense of not being alone (Harms & Biocca, 2004). The minimum score was a response of 4 and the maximum score was a response of 7 for this subscale. The mean score of student responses for the Co-Presence subscale was 5.80 (*SD* = 0.98), suggesting students felt like they were not alone while participating in the virtual reality innovation experience. The first statement on the Co-Presence subscale "I noticed other virtual reality book club participants" had the highest mean score of 6.22 (*SD* = 0.67). A score of 6 is equivalent to students agreeing with the statement. Thus, participants tended to agree with this statement. The fourth statement on the Co-Presence subscale "My presence was obvious to other virtual reality book club participants" had the lowest mean score of 5.33 (*SD* = 1.12). A score of 5 is equivalent to students slightly agreeing with the statement. Thus, students showed a tendency to slightly agree with this assertion. Of the six Networked Minds Social Presence measure subscales, the students' response mean score on the Co-

Presence subscale was the highest. Thus, this subscale demonstrates a mean score reflective of being close to agreement in their perceptions.

Attentional Allocation. The Attentional Allocation subscale of the Networked Minds Social Presence measure speaks to students feeling a sense of mutual awareness (Harms & Biocca, 2004). The minimum score was a response of 1 and the maximum score was a response of 7 for this subscale. The mean score of student responses for the Attentional Allocation subscale was 4.35 (*SD* = 1.58), suggesting the students' sense of mutual awareness when interacting in the virtual worlds neared neutrality. The third statement on the Attentional Allocation subscale "I remained focused on other virtual reality book club participants throughout our interaction" had the highest mean score of 5.00 (*SD* = 1.50). This demonstrates that students tended to slightly agree with this question relating to their allocation of attention within virtual reality. The second statement on the Attentional Allocation subscale "Other virtual reality book club participants were easily distracted from me when other things were going on" had a mean score of 3.89 (*SD* = 2.15). The last statement on the Attentional Allocation subscale "I did not receive my virtual reality book club participants' full attention" also had a mean score of 3.89 (*SD* = 0.93). These two reverse coded items had the lowest mean scores on this subscale. The student responses neared neutrality relating to these two statements.

Perceived Message Understanding. The Perceived Message Understanding subscale of the Networked Minds Social Presence measure speaks to students feeling like they can understand other participants (Harms & Biocca, 2004). The minimum score was a response of 1 and the maximum score was a response of 7 for this subscale. The mean score of student responses for the Perceived Message Understanding subscale was 5.51

(*SD* = 1.31), suggesting students were between a slight disagreement to feeling neutral in their responses to feeling like they could understand other participants within the virtual world setting. The second statement on the Perceived Message Understanding subscale "Other virtual reality book club participants' thoughts were clearly expressed with me" had the highest mean score of 6.38 (*SD* = 0.74). This provides evidence that students tended to agree with this statement. After reverse coding, the fourth statement on the Perceived Message Understanding subscale "Understanding other virtual reality book club participants was difficult" had the lowest mean score of 4.67 (*SD* = 1.73). Due to reverse coding, this score suggests disagreement with the statement.

Perceived Affective Understanding. The Perceived Affective Understanding subscale of the Networked Minds Social Presence measure speaks to how the affective states of other participants are understood by the student (Harms & Biocca, 2004). The minimum score was a response of 4 and the maximum score was a response of 7 for this subscale. The mean score of student responses for the Perceived Affective Understanding subscale was 4.48 (*SD* = 1.38), suggesting the students were between neutral to in slight agreement of their understanding of other participants' emotions. The first statement on the Perceived Affective Understanding subscale "I could tell how other virtual reality book club participants felt" had the highest mean score of 5.67 (*SD* = 1.12). This suggests that students tended to respond between slightly agreeing and agreeing with the statement. The fourth statement on the Perceived Affective Understanding subscale "My emotions were not clear to other virtual reality book club participants" had the lowest mean score of 3.44 (*SD* = 1.67). Due to reverse coding, this suggests students felt between slight agreement and neither agreement nor disagreement for this item.

Perceived Emotional Interdependence. The Perceived Emotional Interdependence subscale of the Networked Minds Social Presence measure speaks to how students feel they have insight into or respond to the emotions of other participants (Harms & Biocca, 2004). The minimum score was a response of 1 and the maximum score was a response of 7 for this subscale. The mean score of student responses for the Perceived Emotional Interdependence subscale was 4.74 (*SD* = 1.59), suggesting the students were close to being in slight agreement in feeling the moods of others influenced interactions taking place with the virtual worlds. The third statement on the Perceived Emotional Interdependence subscale "Other virtual reality book club participants' feelings influenced the mood of our interaction" had the highest mean score of 5.00 (*SD* = 1.41). Thus, this score provides evidence of slight agreement with the sentiment. The second statement on the Perceived Emotional Interdependence subscale "Other virtual reality book club participants were sometimes influenced by my moods" had the lowest mean score of 4.56 (*SD* = 1.81). This score suggests that students tended to be between neutral and slightly agreeing with the assertion.

Perceived Behavioral Interdependence. The Perceived Behavioral Interdependence subscale of the Networked Minds Social Presence measure speaks to how students feel their actions are either connected or responsive to other participants actions (Harms & Biocca, 2004). The minimum score was a response of 1 and the maximum score was a response of 7 for this subscale. The mean score of student responses for the Perceived Behavioral Interdependence subscale was 4.17 (*SD* = 1.67), suggesting students were just above neutral in their perceptions regarding how their behavior impacted others as well as how others' behaviors impacted them. The first

statement on the Perceived Behavioral Interdependence subscale "My behavior was often in direct response to other virtual reality book club participants' behavior" had the highest mean score of 4.67 (*SD* = 2.06). Students tended to score between slightly agreeing and neutral regarding this item. The fifth statement on the Perceived Behavioral Interdependence subscale "Other virtual reality book club participants' behavior was closely tied to my behavior" had the lowest mean score of 3.67 (*SD* = 1.50). This data provides evidence that students tended to feel between slight disagreement and neutrality relating to this statement. Of the six Networked Minds Social Presence measure subscales, the students' response mean score on the Perceived Behavioral Interdependence subscale was the lowest. Thus, this subscale mean score suggests students tended to feel more neutral on these items than many of the other items.

Social Presence Survey

The Social Presence Survey (Nowak & Biocca, 2003) was used to assess the students' measure of social presence while engaged in the virtual reality book club setting. The Social Presence Survey consisted of four statements and the students responded by placing their mouse on the sliding scale from 0 to 1. The closer to 0 the student placed their mouse the more they found the statement to represent their reaction. The closer to 1 the student placed their mouse the more they found the statement to not represent their reaction. The nearest hundredth of where the students responded was used in this data analysis.

Descriptive Statistics. Descriptive statistics can be used in relation to survey data (Fink, 1995). Overall, the mean score for the Social Presence Survey was 0.39 (*SD* = 0.26). The students responded the most in agreement with the question "To what extent

was this virtual reality experience like you were in the same room with the other participants?" (M = 0.32, SD = 0.31). A score of 0 means "A lot like being in the same room" and a score of 1 means "Not like being in the same room at all." The students' responses suggest they felt closer to feeling like they were in the same room with other participants when engaged in the virtual worlds. Although the mean score of the students' responses suggested feeling neutral (A score of 0 means "Very real" and a score of 1 means "Not real at all"), the students responded the least in agreement to the question "To what extent did other participants seem 'real' while engaged in this virtual reality experience?" (M = 0.51, SD = 0.20). The students' responses suggest they felt other participants to neither feel "Very real" nor "Not real at all." Table 4.6 shows the descriptive statistics for each of the questions on the Social Presence Survey.

Table 4.6 *Descriptive Statistics for the Social Presence Survey*

Social Presence Survey Questions	*M*	*SD*
To what extent was this virtual reality experience like you were in the same room with the other participants?	0.32	0.31
To what extent did other participants seem 'real' while engaged in this virtual reality experience?	0.51	0.20
How likely is it that you would choose to use a virtual reality system to work with peers in furthering everyone's knowledge about academic subject?	0.38	0.30
To what extent did you feel you could get to know someone that you met only through this virtual book club?	0.36	0.22

Qualitative Findings and Interpretation

In this study, two different qualitative data sources were used: student interviews and weekly writing prompts. In studying virtual worlds, previous scholars have also used

interviews (Dickey, 2003) and student writing (Yildirim, Elban, & Yildirim, 2018). In this study, four rounds of first cycle coding methods were conducted to better understand the contents of the student interviews and the weekly writing prompts. *Structural Coding*, *Emotion Coding*, *In Vivo Coding*, and *Process Coding* were used for this qualitative analysis. Delve, an online qualitative data analysis tool, was used to create codes in a sentence-by-sentence unit of analysis of both qualitative data sources. Codes generated were then downloaded into an Excel file which was then uploaded into Google Sheets as a way to analyze the relationship between the numerous codes. My dissertation co-chair helped me analyze the qualitative data through the inductive analysis process. Three hundred and two unduplicated codes were developed from the student interviews while 65 codes were created from the weekly writing prompts. A total of 367 unduplicated codes were generated from this data (see Table 4.7).

Table 4.7 *Summary of Qualitative Codes*

Qualitative Data Source	Number of Sources	Number of Unduplicated Codes Applied
Writing Prompts (Open-Ended Questions)	8	65
Student Interviews	5	302
Total	13	367

Saldaña (2016, p. 218) discusses the work of Anfara (2008) while noting he is citing Brown (1999) in his discussion of code mapping. Saldaña (2016) further explains how codes are used to create categories and from categories that themes are generated. In the words of Thomas, "*inductive analysis* refers to approaches that primarily use detailed readings of raw data to derive concepts, themes, or a model through interpretations made

from the raw data by an evaluator or researcher" (p. 238). The author notes that his conception of inductive analysis aligns with that of Strauss and Corbin (1998). This qualitative research followed a similar procedure while using inductive analysis to allow for themes to emerge out of the processing of the data (Thomas, 2006).

First Cycle Coding

The student interviews and writing prompt responses were analyzed using the *Structural Coding* method. *Structural coding* uses a "specific research question to both code and categorize the data" (Saldaña, 2016, p. 297). This research was focused on two research questions and during the first review of the data, content was coded accordingly. The first research question was based on students' knowledge of Shakespearean works while the second research question was based on their level of social presence. Therefore, *Shakespeare Knowledge* and *Social Presence* were the two codes generated during the *Structural coding* method.

Emotion coding was used to analyze qualitative data. *Emotion coding* focused on participants' affective states (Saldaña, 2021). The student interview with Taylor offered a response that was coded using *Emotion Coding*. Taylor shared "And then, and, uh, I think it was fun doing the VR learning 'cause like I said, you get to meet new people". In this statement, Taylor's affective state was revealed, leading to the code *enjoyment* being generated. In another example, the code *excited* was generated from Jordan's student interview statement, "And I just felt really, like, excited talking to all the other kids and it was really interesting." The word "excited" revealed the emotion of excitement, thus when going through the data using the *Emotion coding* method, the code of *excitement* was created. Writing prompts were also coded using *Emotion coding*. For example,

Alex's writing prompt included the statement, "The other participants attitude toward The Tragedy of Julius Caesar was sad so this influenced me to feel sad about the death." This statement revealed their emotion of sadness and thus, the *Emotion code* of *sad* was generated. *Cheerful, attentive,* and *thoughtful* are also examples of codes generated using the *Emotion Coding* method. A total of 20 unduplicated codes were generated through *Emotion Coding*.

The *In Vivo coding* method was conducted to analyze the qualitative data. *In Vivo codes* were created using direct quotes from the students as found in the student interview transcripts and their weekly writing prompts. These codes have been described as providing "symbolic markers of participants' speech and meanings" (Charmaz, 2006, p.55). For example, Kyle's student interview response of "I just, I think that this is a really fun way to learn. I feel like this is a great way to make friends." is an example where two *In Vivo codes* were generated: "*fun way to learn*" and "*great way to make friends*". *In Vivo codes* were generated based on writing prompts as well. For example, "*the actor made everything clear*" and "*we were talking about the painting*" were both codes generated from the writing prompt responses, "the actor made everything clear" and "when we were talking about the painting at the beginning," respectively. *"I felt more comfortable,"* "*easier to interact*", "*great way to make friends*", *"learned more about Shakespeare*" and "*gloom of the graveyard*" are also examples of codes generated using the *In Vivo Coding* method. *In Vivo* coding led to 239 unduplicated codes.

Process coding was used to investigate the qualitative data. When engaged in *Process coding*, gerunds are used in order to generate codes gerunds from the qualitative data" (Saldaña, 2021, pg. 97). For example, the student interview response from Taylor,

"Um, basically, I think the throne room helped all of us envision what it may have been like for that period of time" led to the code *considering the time period* being generated. From a participants' writing prompt, "In the theater, when other people would move around, I follow them" the code of *imitating behaviors* was created. Other codes generated when using the *Process coding* method were *feeling happy, copying an avatar, teleporting in virtual reality, comparing to field trip,* and *visualizing the environment.* The *Process coding* method led to 107 unduplicated codes.

See Table 4.8 for the breakdown of how many codes were generated for each method of first cycle coding.

Table 4.8 *First Cycle Coding Methods and Codes Generated*

Coding Method	Number of Unduplicated Codes Applied
Structural Coding	2
Emotion Coding	20
In Vivo Coding	239
Process Coding	106
Total	367

Code Mapping

Code mapping is used to organize and better manage the corpus of codes generated (Saldaña, 2021). Eventually, the researcher uses the subcodes to help develop categories which are then used to develop themes. Through use of the color-coding feature in Google Sheets, the large number of codes developed from the student interviews and writing prompts was reduced down to 47 subgroups. After another round

of processing the subcodes with my dissertation co-chair, the 47 subgroups were reduced to 25 subgroups of codes.

Second Cycle Coding

Pattern coding was used to process the data encapsulated within the subgroups of codes. *Pattern coding*, according to Saldaña (2016), deals with both the organization of the data and its significance. Saldaña states that "Pattern Codes not only organize the corpus but attempt to attribute meaning to that organization" (p.321). Saldaña cites Miles, Huberman, & Saldaña in describing *Pattern coding* as "condensing large amounts of data into a smaller number of analytic units" (Saldaña, 2016, pg. 322). To demonstrate how the *Pattern coding* method was used, in the first cycle coding process numerous codes relating to items were generated. For example, *pouring popcorn*, *throwing tomatoes*, and *using items in virtual reality* were generated through *Pattern coding*. These codes were all color coded the same and became a broader subcode of *Interacting with objects*. After additional processing, the codes within the broader subcode were used to produce the more abstract category of Action in VR. For example, "*Reading aloud*" and "*hearing tone of voice*" were also subsumed in this broader category. The common pattern that was seen throughout the data was in relation to some form of action taking place within the virtual worlds. Another pattern I noticed within several codes related to historical individuals. For example, *feeling positive about Shakespeare* and *imagining Julius Caesar* both fit in with this pattern. These two codes, plus "*very straightforward*" and "*really easy to understand*," were placed within two subgroups, Historical individuals and Knowledge and learning. Eventually these subgroups were subsumed into the

broader category Shakespearean knowledge based on *Pattern coding* taking place. In total, 13 categories were developed.

Themes and Findings

Pattern coding is the process by which the data from coding is used to recognize themes (Saldaña, 2021). Previous research has discussed inductive analysis of qualitative data through the creation of categories that reveal themes of the data (Thomas, 2006). Peer debriefing has been conducted before in the context of education research (Figg, Wenrick, Youker, Heilman, & Schneider, 2010). In peer debriefing, categories that emerge from transcriptions are examined by a peer (Janesick, 2007). In this research, my dissertation co-chair offered peer debriefing that assisted with the development of both categories and themes.

Table 4.9 *Themes, Categories, and Sample Quotes*

Theme	Categories	Sample quotes
Students enjoyed sharing a common virtual reality experience while developing a sense of social cohesion.	Enjoyment with virtual reality	Jessie: When someone would say or do something funny, it would make me feel happier. (Seventh week writing prompt response)
Students enjoyed sharing a common virtual reality experience while developing a sense of social cohesion.	Engagement in virtual reality	Jordan: When someone gasped because Richard the third said he would marry a girl than he would kill her (Eighth week writing prompt response)
Students enjoyed sharing a common virtual reality experience while developing a sense of social cohesion.	Virtual reality mental process	Kyle: And you could understand how they felt about it. ‘Cause we all had a chance to describe what was happening in our brains.

Virtual reality played a powerful role in creating social connection among students.	Social Presence	Kyle: I feel like that was just kind of...it was very easy to be social, and to share your opinions in...just in here. (Student interview)
Virtual reality played a powerful role in creating social connection among students.	Student interactions	Shawn: Um, it was also kind of cool being able to speak with other people on the subject and other people agreeing with some things that I had did say. (Student interview)
Virtual reality played a powerful role in creating social connection among students.	Compare and contrast VR	Kyle: Just like you could tell what kind of person they were just by how they spoke in the class and who they spoke to. It was just...it was easier to interact with them and figure out what kind of people they were.
Virtual reality played a powerful role in creating social connection among students.	Avatars	Jordan: Well, one, you can like…you don't have to, like, be scared of how you look…in real life…you can look however you want to. (Student interview)
The immersive nature of virtual reality furthered students' knowledge about Shakespeare.	Immersion	Taylor: Um, basically, I think the throne room helped all of us envision what it may have been like for that period of time. (Student interview)
The immersive nature of virtual reality furthered students' knowledge about Shakespeare.	Action in VR	Kyle: Like, for instance, whenever I would read for the class, um, I felt that was more comfortable than in person. (Student interview)

The immersive nature of virtual reality furthered students' knowledge about Shakespeare.	The arts in virtual reality	Shawn: And the Pantheon is showing us all the architect and whatnot wi– going on showing how they would build things inside of it. (Student interview)
The immersive nature of virtual reality furthered students' knowledge about Shakespeare.	Traveling in VR	Jordan: Like, explore the virtual worlds and, like, walk around and, like, see how it used to be a long time ago. … And you can also, like, play with your friends and just like teleport places and it looks...like at school, it's like, you're at the same place all day just like a classroom. (Student interview)
The immersive nature of virtual reality furthered students' knowledge about Shakespeare.	Shakesperean settings in virtual worlds	Taylor: Um, it was just a very sad moment. Like we all knew it was sad, but just the gloom of the graveyard must have pack that on top. (Student interview)
The immersive nature of virtual reality furthered students' knowledge about Shakespeare.	Shakesperean Knowledge	Chris: One of my fellow class mates said, "Cassius is attempting to change someone's opinion." (First week writing prompt response)

The three themes that emerged from both qualitative data sources were (1) Students enjoyed sharing a common virtual reality experience while developing a sense of social cohesion, (2) Virtual reality played a powerful role in creating social connection among

students, and (3) The immersive nature of virtual reality furthered students' knowledge about Shakespeare.

Theme One: Students enjoyed sharing a common virtual reality experience while developing a sense of social cohesion. In peer debriefing about what the students were experiencing via the codes and categories developed within this theme, ideas of feeling bonded to each other or having a common experience to enjoy together resulted in the social cohesion aspect of this theme. Establishing group cohesion was found in the research of Burgess et al. (2010) where their research focused on multi-user virtual environments. A sense of social cohesion could be seen by the extent by which students enjoyed participating in discussion and exploration within the virtual worlds. This line of thinking is consistent with prior research suggesting a positive correlation between student engagement and the use of virtual reality (Allcoat & von Mühlenen, 2018; Liu et al., 2020). Student interview data demonstrated that the students enjoyed their virtual reality experience with one another. The following responses from Kyle and Jordan's student interviews demonstrates enjoyment, engagement, and a reference to an inner mental process.

> Kyle: I just...I feel like it helped in a lot of ways, including just making it easier to talk about how you felt and talk about your opinions. Especially because me and [Jessie] were in here together. And typically [they]she's really sad—shy—but he or she was really outspoken. You know, it's just I noticed a real change in confidence in everybody that I knew.

> Jordan: Well, it was like, how, like, everything looked old. And I hadn't seen something like that before. And it made me, like...it's like...it's like, it's kind of like a field trip at your house. And you don't really have to, like, go anywhere. And it's, like, much easier than, like, flying somewhere. And which made it, like, really fun. And felt like real life.

This theme is also supported by Jessie's seventh week writing prompt, "When someone would say or do something funny, it would make me feel happier." Taylor's student interview response, "it was mostly just when people got along a lot. It would be fun to do and make me happy" shows how connected the social presence element and the positive emotions in virtual reality were experienced by the students. The enjoyment of students that often related to social bonds being established, their inner mental processes, and how students felt engagement during their virtual book club experience supported the development of this theme. Three categories were subsumed in the development of this theme: (1) Enjoyment with virtual reality, (2) Engagement in virtual reality, and (3) Virtual reality inner mental process.

Enjoyment with virtual reality. Much of the qualitative data revealed the students of this study to enjoy their virtual reality book club experiences. Taylor offered a student interview response, "Um, I feel like everybody was just happy to be in the class itself. Because it was enjoyable to be in." From Taylor's comment, the *Emotion code* of *enjoyment* was generated. Jordan noted in their student interview that it "just felt really like, excited talking to all the other kids and it was really interesting." The *Emotion code* of *excited* was created from this comment. An additional *Emotion code* generated in this category was *excited*.

One example of a *Process code* generated in this category that reflected how the students experienced enjoyment with virtual reality was *feeling better about oneself*. Additional *In Vivo codes* generated in this category included "*it was joy*", "*make me feel happier*" and "*fun to do*". These codes were generated from the qualitative responses of four students,

Jordan: And it makes me learn better 'cause I feel better about myself. (Student interview)

I guess it was joy. 'Cause I was having fun. And I learned I can make it big and everybody could respawn me and made me feel fun...happy. (Student interview)

Shawn: Um, it was also kind of cool being able to speak with other people on the subject and other people agreeing with some things that I had did say. (Student interview)

Jessie: When someone would say or do something funny, it would make me feel happier. (Seventh week writing prompt response)

Taylor: Um, I think it was...it was mostly just when people got along a lot. It would just be fun to do and make me happy. (Student interview)

The codes that were generated from the qualitative data sources in this category revealed that students found enjoyment in their virtual book club experiences.

It is important to note that enjoyment within virtual reality was often connected with the social element of the experience. From Shawn noting it was "kind of cool being able to speak with other people" to Jessie writing in their writing prompt response that "someone would say or do something funny," this category should be considered within the context of research on social presence. Taylor's comment relating to how "people got along a lot" underscores the perception of social interaction with the virtual worlds. The category of enjoyment further provided evidence of social presence being found by the students in the research. The enjoyment with virtual reality category was made up of 35 unduplicated codes. See Figure 4.1 for examples of codes generated in this category.

Enjoyment with virtual reality
amused
amusement
delighted
enjoyment
excited
feeling excited talking
feeling happy
glad
joy
cheerful
"we all were laughing"
"i knew they were happy"
"make me feel happier"
"happy and accepted"
"it was joy"
"it was really fun"

Figure 4.1 Examples of codes generated into the enjoyment with virtual reality category.

Engagement in virtual reality. The outcomes of the qualitative data from this study suggested that students felt engaged while participating in the virtual reality book club as evident by a range of emotions expressed. During the student interview, the participants were asked how the Pantheon and the theater assisted in teaching them about aspects of *The Tragedy of Julius Caesar*. Jordan discussed aspects of the virtual reality experience in their response, "it was really interesting or intriguing, and it made it fun to learn." From this response, the *Process code finding learning fun* was created. Additionally, Alex wrote in their week 4 writing prompt response after participating in the second Macbeth virtual reality session, "When Macduff killed Macbeth I think everybody was shocked and I was too." This writing prompt response led to the *Emotion code* of *shocked* and the *In Vivo code*, "*everybody was shocked*". These codes were used

to support the category Engagement in virtual reality as they reflected how students were actively engaged in the virtual reality sessions.

An additional example of an *Emotion code* subsumed into this category was *interested*. Additional examples of *In Vivo codes* subsumed into this category were "*someone gasped*", "*The Shakespeare was pretty cool*", and "*participants caught my attention*." An additional example of a *Process code* subsumed into this category was *noticing a glitch*. Five comments by students in varied qualitative data sources supported how these codes were created,

> Alex: Another example...um...about the experience of virtual reality would be...like, it was cool 'cause it felt like you were actually in the world, you know? (Student interview)
>
> Jordan: When someone gasped because Richard the third said he would marry a girl than he would kill her (Eighth week writing prompt response)
>
> Shawn: The Shakespeare was pretty cool. There were some funny and sad parts inside of it. (Student interview)
>
> Jessie: In the make up class that I attended, two of the other participants caught my attention because of their actions. (First week writing prompt response)
>
> Taylor: Um, when...when they would be s—a glitching or something. It would just catch my eye. (Student interview)

The emotions expressed by the participants while they participated in different virtual worlds reflect their engagement with the content as well as the characters and settings in the virtual reality book club. Both Jordan and Alex demonstrate the connection between Shakespearean knowledge and social connection. Jordan noticed that another student gasped during *Richard III* at a certain part of the work. Alex stated "everyone was shocked" at the death of Macbeth. Both these codes demonstrate not only Shakesperean

knowledge but also highlight how virtual reality promoted a social experience for the students.

The students were also noticing the emotions of others within the virtual worlds in relation to Shakespearean content. Being able to recognize other participants' emotions is an aspect of social presence (Harms & Biocca, 2004). Thus, this category should be viewed as further evidence that students experienced social presence while participating in virtual reality learning. The engagement in virtual reality was a category made up of 24 unduplicated codes. See Figure 4.2 for codes generated in this category.

Engagement in virtual reality
interested
intrigued
"they were very interesting"
"it was really interesting or intriguing"
"paying attention"
"attention grabbing"
"participants caught my attention"
"The Shakespeare was pretty cool"
learning things in a fun way
finding learning fun
shocked
"someone gasped"
"a fellow student gasped"
"everybody was shocked"
noticing a glitch
observing a change
attentive
sad
"it was quite sad"
"it was sad"

Figure 4.2 Examples of codes generated into the engagement in virtual reality category.

Virtual reality mental process. Mental processes relating to their virtual reality experiences were shared by the students in their interview responses of this study. For

example, Kyle stated during their interview, "Um, I think there was one time when, I think it was [Carsen], wasn't really like describing what she was saying very well. And I was a little confused. And I think I asked [them] to like, rephrase or something." The *Emotion code* of *perplexed* was generated from Kyle's comment as it showed their mental processing taking place within their virtual book club experience. Examples of *Process codes* generated in this category included *creating mental imagery*, *imagining the work*, and *attempting to remember*. Examples of *In Vivo codes* generated in this category that focused on the inner mental experience of the students, included "*visualize it in my head*" and "*in our brains*." These codes were generated using the following student interview comments,

> Shawn: I'm playing them–playing them through my head.
>
> Jordan: Well, like, I could really understand, like, visualize it in my head when I was reading the story.
>
> Kyle : Um, I think there was just one time when, I think it was [Carsen], wasn't really like describing what she was saying very well. And I was a little confused. And I think I asked her to like, rephrase or something.
>
> And you could understand how they felt about it. 'Cause we all had a chance to describe what was happening in our brains.

These responses emphasized the interaction between the student's imagination, the virtual reality technology, and the experiences of the students in the virtual book club. The virtual reality mental process category that emerged during the qualitative data analysis of this research, subsumed seven unduplicated codes. See Figure 4.3 for codes generated in this category.

Virtual reality mental process
creating mental imagery
imagining the work
"visualize it in my head"
feeling confused
perplexed
"a little confused"
"in our brains"

Figure 4.3 Codes generated into the virtual reality mental process category.

Theme Two: Virtual reality played a powerful role in creating social connection among students. The Community of Inquiry model defines social presence as the extent to which interactants view themselves as part of the group, communicate with one another in a trusting atmosphere, and use the projection of their own personalities to develop connections (Garrison, 2009). This theme supports the idea that virtual reality can be used to promote this construct of social presence. During peer debriefing sessions my co-chair and I would talk about what the students were experiencing when looking for patterns within the codes and categories. This research shows building relationships with their peers, laughing together, and exploring the virtual words together had a meaningful impact on the student's virtual reality book club experience. This became even more pronounced when comparing the student's virtual reality interactions with their in-person social interactions. This is consistent with research demonstrating that online instruction can bring a higher level of social presence than in-person instruction (Alman et al., 2012; Wu et al., 2017). The following participant interview responses by three students demonstrate the power of virtual reality to facilitate social experiences for students.

Jordan: They would respond pretty nice. It was never, like, really, like, in real life a lot of times when people respond to you they, like, say,

like, something, like, really jerky and mean. But, like, they would respond nicely in VR and it made me feel happy and accepted.

Taylor: And then, and, uh, I think it was fun doing the VR learning 'cause like I said, you get to meet new people.

Kyle: I feel like this is a great way to make friends. I feel like this is a great way to learn about things…it's very hard for me to visualize settings and stuff. So it helped me understand the placement of different things and all that.

Furthermore, when Shawn was asked in the student interviews whether it was easier to make friends in real life or in virtual reality, they responded, "I guess it was kind of easier because we didn't really meet in person. It wasn't as awkward, I guess." A similar sentiment was found often the student interview data about feeling it was easier to make friends in virtual reality when compared with real life. For example, Taylor shared, "I think it was a lot easier because it would...like you could just say stuff without being, say, insecure or anxious about what they will think 'cause you're...it's not very likely you're ever gonna see 'em." Kyle also stated in their student interview response,

> I feel like it just makes you more comfortable having discussions with other people and opening up. And I feel like it was also easier to make friends just because there wasn't any sort of like face to connect people to. Like, you couldn't be like, 'That person looks weird.' You know? You could just make friends.

During their student interviews the participants noted how multiple students would transform into the same avatar within virtual reality. Taylor shared that "a group of four or five people would just become" the same avatar and they saw this as a way that behavior was reciprocated within virtual reality. As well, Jordan stated, "Well, one, you can like...you don't have to, like, be scared of how you look...in real life....you can look

however you want to". This further supports how avatars played a role in the social interactions within the student's virtual reality experience.

Four categories were subsumed in the development of this theme: (1) Social presence, (2) Student interactions, (3) Compare and contrast VR, and (4) Avatars.

***Social presence*.** In this study, there were numerous ways that social presence was demonstrated while students were engaged in virtual reality. During the virtual reality book club sessions, students connected and interacted with others in another location in real-time. Evidence of these two social presence attributes was discussed in the Engagement in virtual reality and the student interactions categories above. While distant, students still brought humor, imitation, and student discussion into the virtual worlds. Alex shared in their student interview, "whenever you know that stuff, like they have those swords or whatever, in the throne room? Like whenever one avatar, started picking one up, other avatars would go there and get one too, you know?" From Alex's comment, the *Process code* of *seeing participants' imitative behaviors* was created. This code reflected how the students would imitate one another within virtual reality.

In their week four writing prompt, Alex demonstrated how virtual objects can relate to a social connection being experienced. After the first visit to the throne room, Alex wrote, "when I grabbed the sword the other participants tried to chase me to get the sword that I had." Both Alex's student interview response and writing prompt response identified how virtual objects played a role in promoting the social presence element that was found in their virtual reality experience. Kyle also shared in their student interview response that "everyone had different opinions, but we still felt safe." From Kyle's comment, *"we still felt safe"* was coded as an *In Vivo code*. Shawn responded that he was

provided the ability to "go past what I usually do and just…I was able to see new people…" during his student interview. The words *"see new people"* was used as an *In Vivo code*. From the use of virtual objects to imitative behaviors, to feeling a sense of safety when participating in the virtual book club, students identified how they experienced social presence.

Additional examples of *Process codes* generated within this category that reflected the social element of the students' virtual reality experience included *finding making friends easier* and *meeting different people*. Additional examples of *In Vivo codes* generated included "*out of their shell*," "*easy to be social*", "*pretty good social interactions*", "*I would follow*", and "*I copied it*". These codes were generated from the following sources of qualitative data:

Taylor: I think it was easier because you could...just...I think it was a lot easier because it would...like you could just say stuff… (Student interview)

Alex: Um, one example would be that I got to meet, like, a bunch of different people. (Student interview)

someone got out a sword so I pulled out a sword (Third week writing prompt response Writing Prompt)

Kyle: It just...it made people come out of their shell a lot more, I feel like. (Student interview)

I feel like that was just kind of...it was very easy to be social, and to share your opinions in...just in here. (Student interview)

And how even though we all had different opinions of all these things we read about, or like...[laughs] you know, experienced, it's just...it showed that everyone had different opinions, but we still felt safe. Or, I guess, like, we felt more comfortable sharing them. (Student interview)

Jordan: Well, it just made me feel, like, much better and it was, like, pretty good social interactions. (Student interview)

Jessie: In the theater, when other people would move around, I would follow them. (Sixth week writing prompt response)

I could tell most of us were having a good time because we were all laughing and making jokes. (Seventh week writing prompt response)

The codes that were generated from the qualitative data sources in this category provided a better understanding of ways in which the students of this study perceived social presence occurring within virtual reality. This category was made up of 41 unduplicated codes. See Figure 4.4 for examples of codes generated in this category.

Social presence
making friends easier
making friends
playing with friends
sharing similar interests
finding making friends easier
acceptance
feeling accepted
finding common interests
making participant feel better
"excited talking to all the other kids"

Figure 4.4 Examples of codes generated into the social presence category.

Student interactions. The qualitative data analyzed from this study helped to better understand the role of student interactions in relation to the social presence indicators that were explored. During the first virtual reality book club session, the students visited the Pantheon and sat in an amphitheater. An actor arrived and recited lines from the character Cassius in *The Tragedy of Julius Caesar*. Chris offered in their week one writing prompt response that, 'One of my fellow classmates said, "Cassius is attempting to change someone's opinion." From Chris' response the *In Vivo code* "*fellow class mates said*" was created. This provides evidence for student interaction as early as

the first week. Shawn also commented in this student interview that, "Um, it was also kind of cool being able to speak with other people on the subject and other people agreeing with some things that I had did say." This sentence was coded as the *Process code, speaking with others*. Shawn also commented in a weekly writing prompt that they "could tell how [Kyle] was feeling whenever [they] did say things on destiny or whenever we talked about choice or destiny". This sentence was coded as the *In Vivo code*, "*we talked about choice or destiny*". Shawn was not the only student to note during the interviews about dialogue within virtual reality. One *Process code, discussing choice and destiny*, was generated from Kyle's student interview statement, "I think our last discussion was a really big representation of the overall environment. You know, where we talked about choice versus destiny." These examples of codes reflected how students interacted in the virtual reality book club sessions.

Additional examples of *In Vivo codes* generated that focused on the students interacting included "*you could just start talking to someone*," "*I was understood*", "*sharing our opinions*", "*we talked about choice or destiny*", and "*we talked*". An additional *Process code* generated within this category was *understanding another participant at the Pantheon*. Four students' comments found in varied qualitative data sources supported how these codes were created,

Kyle: Um, you know, so I feel like I was understood most of the time. (Student interview)

Shawn: Um, it was also kind of cool being able to speak with other people on the subject and other people agreeing with some things that I had did say. (Student interview)

Alex: Like, we got to know each other and we talked and stuff. (Student interview)

Carsen: when we were at the pantheon after the speech you asked what we

> thought he meant she was able to explain her thoughts well. (First week writing prompt response)

These and other participant responses that were generated from the qualitative data sources in this category reflect that there was a plentiful amount of student interactions taking place within the virtual reality book club. This category suggests that student interaction was an important element of virtual reality innovation. This category was made up of 88 unduplicated codes. See Figure 4.5 for examples of codes generated in this category.

Student interactions
"discussing about Shakespeare"
joking together
interacting with others
listening to opinions
communicating effectively
communicating thoughts
laughing together
participating in conversation
responding to another participant
speaking with others
"see the interactions"
discussing a monarch
discussing a painting
discussing a video game
discussing choice or destiny
teleporting in virtual reality
understanding another participant at the Pantheon
conversing about Shakespeare
discussing a line of Cassius
discussing Shakespeare quote
"how open the discussions were"
understanding the environment
agreeing with another participant

Figure 4.5 Examples of codes generated into the student interactions category.

Compare and contrast VR. In this study the students compared their social experiences in virtual reality with their in-person daily experiences. Most of the students interviewed shared that it was easier to make friends in virtual reality than in real life. For example, Jordan shared, "It was never like, really, like, in real life a lot of times when people respond to you they, like, say, something, like, really jerky and mean." From this response the *Process code contrasting in-person responses* was created. When asked in their student interview whether it was easier to form friendships in virtual reality when compared to the real world, Kyle stated, "I feel like it was definitely easier just because there was nothing really to judge people off of other than personality." The *In Vivo code* "*definitely easier*" was generated from Kyle's comment. In contrast, Alex was the only student who shared in their student interview that they found it to be "more, like, um difficult in virtual reality to make friends." An *In Vivo code* created from this student's comment was "*more difficult in virtual reality*." Past research using qualitative interview data on virtual reality provides evidence that students' views on virtual reality will not always be uniform (Freeman & Maloney, 2021).

Some of these patterns within the codes of this category suggested that some students identified finding it easier to make friends in virtual reality when compared to in-person settings. Additional example of codes created in this category were the I*n Vivo codes* of "*easier to interact"*, "*we felt more comfortable"*, and "*it's kind of like a field trip at your house*." Additional *Process Codes* created in this category were *finding making friends easier* and *making friends easier*. These codes were created from the student interview responses of four students,

Kyle: Just like you could tell what kind of person they were just by how

they spoke in the class and who they spoke to. It was just...it was easier to interact with them and figure out what kind of people they were.

Jordan: And it made me, like...it's like...it's like, it's kind of like a field trip at your house. And you don't really have to, like, go anywhere.

Taylor: I think it was a lot easier because it would…like you could just say stuff without being, say, insecure or anxious about what they will think…

Shawn: I guess it was kind of easier because we didn't like really meet in person. It wasn't as awkward, I guess.

These responses revealed the social aspects of virtual reality and how students compared and contrasted their experiences in the real world with their virtual reality experiences. Qualitative data also provided evidence for development of the category Compare and contrast VR. The category was made up of 24 unduplicated codes. See Figure 4.6 for codes generated in this category.

Compare and contrast VR
contrasting in-person responses
comparing to real life
comparing to field trip
contrasting virtual reality with real life
contrasting with school
contrasting to in-person instruction
contrasting with in-person instruction
"doesn't feel as boring as school"
"felt like real life"
"it felt like a field trip"
"it's kind of like a field trip at your house"
"easier than, like, flying somewhere"
"easier to read people"
"definitely easier"

Figure 4.6 Examples of codes generated into the compare and contrast VR category.

Avatars. Avatars were a part of the social presence element taking place within the virtual reality book club being explored in this study. Taylor was asked in their interview to share examples of how their own avatar's behavior was in response to the behavior of another person's avatar when in virtual reality. Taylor's response reflected how students would imitate one another by copying the same avatar, "probably when we just started being all the same avatar." From their response the *Process code becoming the same avatar* was generated. Further representing how the avatars were a part of the students' social experience, Jessie noted in their writing prompt response, "In the throne room, someone asked me if I was alright because my avatar looked strange as a result of me lying down." This led to the creation of the *In Vivo code* "*my avatar looked strange*." These codes that led to the development of this avatar category suggest that social presence was found through examples of behaviors, imitations, and feeling like they were sharing a common experience when engaged in the virtual reality book club. *Seeing avatar jumping* and *talking to a student with a specific avatar* are examples of *Process codes* generated and subsumed into this category. *In Vivo codes* generated that dealt with avatars included *"see their avatar moving",* and "*you can look however you want*". Examples from the qualitative data sources were,

> Jordan: Well, one, you can like…you don't have to, like, be scared of how you look…in real life…you can look however you want to. (Student interview)
>
> Carsen: when we were all waiting for the gest to come the girl with the pleg doctor avatar, and I got to talk, and her avatar was one of the ones I noticed first because of me interest in the pleg doctors (First week writing prompt response)
>
> Alex: Whenever another participant's avatar started jumping it caught my attention. (Fifth week writing prompt response)

> And you could, like, see their avatar moving, I guess. (Student interview)

These examples of participant voices underscored the students' perceptions of the avatar's role when experiencing virtual reality. The avatars category was made up of 12 unduplicated codes. See Figure 4.7 for codes generated in this category.

Avatars
becoming the same avatar
copying an avatar
changing avatars
observing an avatar
seeing avatar jumping
talking to a student with a specific avatar
"my avatar looked strange"
"the same avatar"
"a very big avatar"
"couldn't tell the avatars emotions"
"see their avatar moving"
"you can look however you want"

Figure 4.7 Codes generated into the avatars category.

Theme Three: The immersive nature of virtual reality furthered students' knowledge about Shakespeare. In peer debriefing sessions my co-chair and I discussed what the students were experiencing using codes and categories generated from qualitative data. This contributed to the development of this theme relating to the relationship between the students' virtual reality experiences and knowledge about Shakespeare. Virtual worlds were discussed in the research of Girvan (2018) as a means to teach Shakespearean literature. Other scholars have also discussed virtual reality to increase student motivation relating to Shakespeare (McInnis, 2021; Psotka, 2013). The ability to travel in time, socialize in the virtual worlds, and experience different art within

virtual reality resulted in the students having fun, feeling engaged, and being motivated when learning about Shakespeare during their virtual book club experience.

The immersive nature of virtual reality was reflected in many of the student interview responses as well as their weekly writing prompt responses. For example, Shawn stated in their student interview, "Yeah, I got along with just about everyone there had a good time, and whatnot. I definitely learned more about Shakespeare now than I did before." Another student, Jordan, said in their student interview response, "it felt like much more interactive, 'cause I could see how everything looked, and it was much more funner. I usually thought of Shakespeare as boring or reading books, but...when I can see everything...that made it much better." Additionally, as found in Chris and Jessie's weekly writing prompt responses, respectively, "One of my fellow classmates said, Cassius is attempting to change someone's opinion" and "When some people were talking about how he was mourning his childhood friendds [sic]." The codes and categories that were analyzed and led to this theme emerging reflect the students' knowledge about Shakespeare was furthered because of their immersion within the virtual worlds during their weekly virtual book club experience. Six categories were subsumed in the development of this theme: (1) Immersion, (2) Action in VR, (3) The arts in virtual reality, (4) Traveling in VR, (5) Shakespearean settings in virtual worlds, and (6) Shakespearean knowledge.

Immersion. The element of being able to travel in time or become part of the Shakespearean work was present in the qualitative data. During the student interview, Taylor noted when visiting the throne room, "helped all of us envision what it may have been like for that period of time." The phrase "*helped all of us envision*" was generated as

an *In Vivo code*. When discussing visiting the throne room in relation to Macbeth, Jordan stated during their student interview "So maybe, like, it kind of felt cool to, kind of, be in the story." This statement led to the *Process code* of *feeling like he's in the story* being created. Both the *In Vivo code* and the *Process code* demonstrated how the sense of immersion was present during the virtual reality sessions for students.

Examples of *In Vivo codes* generated for this category included "experiencing *the 1500s*" and "*showed you the environment*." Additionally, "*My brain has to, uh, coordinate things with the visuals*" and "*helped us all envision*" were *In Vivo codes* generated that underscored the importance of the visual aspect of immersion. The interview responses of three students were used to generate these codes,

Jordan: So maybe, like, it kind of felt cool to, kind of, be in the story.

But if it like showed like images, again, it was like experiencing the 1500s.

Kyle: I feel like visiting the throne room just really showed you the environment that the play takes place in.

Taylor: Or, um, I know at least my brain has to, uh, coordinate things with visuals.

Um, basically, I think the throne room helped all of us envision what it may have been like for that period of time.

These responses revealed how students experienced immersion relating to different aspects of virtual reality.

This category suggests that virtual reality can be an aid to help students understand the setting of the Shakespearean texts. Feelings of being in the story and a sense of being in another time both point to virtual reality promoting an immersive educational experience for participants. This category shows how virtual reality helped

students envision what it may have been like at another period in history. Thus, the codes that led to the development of this category provided support for the use of virtual reality in furthering students' knowledge of Shakespearean texts. This category was made up of 10 unduplicated codes. See Figure 4.8 for codes generated in this category.

Immersion
feeling like a guard
feeling like experiencing sixteenth century
feeling like he's in the story
"showed you the environment"
"experiencing the 1500s"
"It kind of felt cool to, kind of, be in the story"
"helps you visualize"
"my brain has to, uh, coordinate things with visuals"
"helped all of us envision"
"experienced"

Figure 4.8 Codes generated into the immersion category.

Action in VR. This category represented ideas from the qualitative data referring to the actions of student's avatars and the visual experiences that the students encountered when using the elements within virtual reality. For example, during their student interview Kyle stated, "And I feel like that just kind of helped you see that, just being able to visualize, okay, they were giving eulogies and stuff in this massive area with tons of people." Kyle's response illustrated how learning about *The Tragedy of Julius Caesar* using virtual worlds helped them in learning more about this content relating to a Shakespearean work. From Kyle's statement, the *Process code, visualizing character action,* was generated. Examples of *Process codes* generated from the data were *reading aloud, pouring popcorn, watching videos, and watching skeletons*. These codes were generated from student interview responses, for example,

Kyle: Like, for instance, whenever I would read for the class, um, I felt that was more comfortable than in person.

Taylor: Probably the time me and …. uh…I forget his name …. [Shawn]...um, before class started we were goofing around with the popcorn [laughs]...and we were just pouring it into each other's buckets.

Alex: Um, we watched videos on the big screen about, um, Shakespeare and Macbeth and stuff.

Um, so the graveyard we, like, discussed, um, Hamlet, and also I'm pretty sure there was, like a, like, we saw them skeletons dancing and stuff.

These comments further supported how the students saw action taking place between each other's avatars as well as action in Hamlet's character being displayed in a virtual world.

Students also shared their perceptions regarding their own actions as well as the actions of other avatars. Examples of *In Vivo codes* generated from the data were "*played the harp"* and *"Someone threw a tomato."* For example, Taylor offered in their first week writing prompt response, "when someone played the harp," when asked to describe how another student's avatar captured their attention while visiting the Pantheon. Jordan offered in their week six writing prompt after having watched a scene from Hamlet that, "someone threw a tomato at me so I threw it back". This response was offered when Jordan was asked to share an example when his avatar's behavior was in response to another student's avatar while watching *Hamlet* in the theater. Additionally, the *In Vivo code* "*someone raised their hands"* was generated from Jordan's week eight writing prompt response, "When someone raised their hands to talk it caught my attention." It is important to note from this comment how Jordan used "someone" having raised their hand rather than "an avatar." This further supports how even in virtual reality participants

still felt like they were in the same room with other participants. The sense of feeling as if one is in the same room with someone even in electronic communication is an aspect of social presence (Short, et al., 1976; Nowak & Biocca, 2003).

The pattern within the codes that led to the development of this category suggested individuals perceived one another to be present and engaging in actions while in virtual reality. This category was made up of 22 unduplicated codes. See Figure 4.9 for codes generated in this category.

Action in VR
visualizing character interactions
visualizing character action
watching skeletons at graveyard
"Hand motions"
"when I was eating"
"someone raised their hands"
"what Walter was saying in charades"
clanging axes in throne room
pouring popcorn
throwing tomatoes
using items in virtual reality
"I threw popcorn"
"Someone threw a tomato"

Figure 4.9 Examples of codes generated into the action in VR category.

The arts in virtual reality. The students commented within their qualitative responses how they experienced the arts while engaging in virtual reality and how that impacted the social element of their learning. Examples of the arts included the performances of the actor and the architecture of the virtual worlds. During this virtual reality session, students were provided the opportunity to explore a cathedral and visit a throne room. During their student interview they were asked to share examples of how the student could perceive another student's emotion while in the virtual world. After the

virtual reality session for *Richard III,* Alex offered in their week seven writing prompt response, "Whenever one of the participants said how they felt about the painting in the church I knew what they were feeling". Alex's comment was coded as a *Process Code* of *understanding another participant's opinion on art*. Thus, the arts helped facilitate an emotional connection relating to academic content when the students were engaged in the virtual reality book club.

Virtual reality can allow individuals to experience paintings in virtual museums as well as see buildings from the past (Cecotti, 2022). Examples of *Process codes* generated that related to the arts included *noting the architecture, making art,* and *seeing paintings*. The code "*painting in the church*" was an example of an *In Vivo code* created to reflect the students' perceptions of the arts used in virtual reality. Examples from the qualitative data supporting these codes being generated were,

> Shawn: And the Pantheon is showing us all the architect and whatnot wi– going on showing how they would build things inside of it. (Student interview)
>
> Kyle: Like, we were just goofing off together and just making like our forts with the drawings. (Student interview).
>
> Jordan: And it was fun to learn about them and see them and experience them. (Student interview)
>
> Alex: Whenever one of the participants said how they felt about the painting in the church I knew what they were feeling. (Seventh week writing prompt response)

Examples of visual arts seen in the virtual worlds was not the only art experienced by the students. Examples of *Process codes* and *In Vivo codes* generated that reflected other forms of art experienced by the students within the virtual worlds included *listening to the actor*, "*the actor was talking*," and "*music playing*". Examples of these can be seen

from the qualitative responses from Shawn, “Um, whenever you or the actor was talking”; Carsen, “When the actor was talking”; and Jordan, “That seemed like really fun and all the music playing.”

The codes that were generated from the qualitative data sources in this category demonstrated the role that the arts played in the student’s virtual reality book club experience on the social element in their learning. Student responses show that virtual reality can be used to teach students about acting, music, and visual art using the technology. The use of words like “we” and “us” suggested that students felt a sense of group cohesion within virtual reality. This category also demonstrated the role of the arts within Shakespeare and how the arts facilitated a positive social learning experience for the students in this study. The arts in virtual reality category was made up of 20 unduplicated codes. See Figure 4.10 for codes generated in this category.

The arts in virtual reality
making art
seeing paintings
"we were talking about the painting"
"painting in the church"
"questions about the paintings"
"paintings around the room"
understanding another participant's opinion on art
"music playing"
considering architecture of cathedral
noting the architecture
remembering architecture
"pretty cool architect"
"the architect and whatnot"
listening to the actor
watching the actor
"the actor was talking"
"the actor made everything very clear"

Figure 4.10 Examples of codes generated into the arts in virtual reality category.

***Traveling in virtual reality*.** This category represented ideas from the qualitative data suggesting that students felt like they had the ability to travel within virtual worlds. For example, Jordan's statement provided in their student interview, "Like, explore the virtual worlds and, like, see how it used to be like a long time ago" was *Process coded* as *exploring virtual worlds*. Additional *Process codes* generated in this category included *exploring another time period* and *exploring virtual worlds. In Vivo codes* generated in this category included "*ran off*" and "*teleport places*." These codes were created from varied qualitative data responses of two students,

> Jordan: So it was hard to like see how it was, and paintings are kinda like, not that realistic…some of them…so having like the ability to explore how things used to be a few thousand years ago was like really interesting.
>
> Like, explore the virtual worlds and, like, walk around and, like, see how it used to be a long time ago. … And you can also, like, play with your friends and just like teleport places and it looks...like at school, it's like, you're at the same place all day just like a classroom. (Student interview)
>
> Carsen: when i asked butter if she wanted to be a puff pastery she ran off. (Third week writing prompt response)

Carsen and Jordan's comments both demonstrate that they perceived travel while participating in the virtual reality book club. Carsen noted that another student "ran off" while Jordan noted that individuals can "walk around" and "teleport places" in virtual reality. These comments underscore how travel was an element experienced by at least these two students within virtual reality. Jordan's comment compared seeing the past in paintings versus seeing the past in virtual reality. This provides evidence that the virtual reality experiences provided a means for the student to explore a setting related to the

content and suggests that exploring virtual worlds assisted in teaching students about Shakespearean works.

The category of Traveling in virtual reality emerged through the process of *Pattern coding*. This category was made up of eight unduplicated codes. See Figure 4.11 for codes generated in this category.

Traveling in virtual reality
running in virtual reality
walking in virtual reality
enjoying freedom
exploring virtual worlds
"you can walk around"
"teleport places"
"ran off"
exploring another time period

Figure 4.11 Codes generated into the traveling in virtual reality category.

Shakespearean settings in virtual worlds. Students found that virtual worlds could help them understand the settings of Shakespearean works. When Jordan was asked in their student interview how the throne room and the theater assisted them in understanding Macbeth's setting and characters, they stated, "Well, like I kind of knew, like, where everything happened. And so I could tell like, what they were doing then and what it looked like." From this comment the *Process code* of *visualizing the environment* was created. Examples of *In Vivo codes* generated in this category included "*gloom of the graveyard*" and "*understand the environment*" and represented what the students remembered seeing within the virtual worlds. Other *In Vivo codes* were more abstract, for example "*see the settings*" and "*it helps you visualize*." These codes were created using the student interview responses of three students:

Jordan: I could like, see it and like, I could imagine what happened to Julius Caesar. And I can imagine him being king and then being killed, like right there. And it helped me, like, understand the environment more.

Taylor: Um, it was just a very sad moment. Like we all knew it was sad, but just the gloom of the graveyard must have pack that on top.

Kyle: Just because you could really see the settings that they were in. You could really see all these things that just helped you understand what was going on more.

It helps you understand that better, just how they could have interacted from over here to over here, you know. I just feel like it helps you visualize that more.

These responses that were generated from the qualitative data sources in this category underscored the importance of the connection with the settings of Shakespeare within the virtual worlds and how that impacted the students virtual book club experience. This category was made up of 20 unduplicated codes. Figure 4.12 for codes generated in this category.

Shakespearean settings in virtual worlds
visualizing the environment
"visualize the environment"
"good sense of environment"
"aesthetics of the room"
"environment that he was in"
"understand the environment"
"see the settings"
"settings of everything"
"easy to visualize"
"visualize settings"
"gloom of the graveyard"
"new setting for us to see"
"inside the VR world"

Figure 4.12 Examples of codes generated into the Shakespearean settings in virtual worlds category.

Shakespearean knowledge. This category provided insight into students' knowledge of the Shakespearean works studied throughout this virtual reality book club innovation. For example, after watching a Shakespearean performance from the actor in the throne room, where the actor performed a passage from *Macbeth,* Kyle wrote in their writing prompt response, "I thought it was sad seeing as his wife died and he kept asking about tomorrow and wondering why she had to die then." From this response, "*he kept asking about tomorrow*" was an *In Vivo code* created. Additionally, Jordan shared in their interview response, "I could like, see it and like, I could imagine what happened to Julius Caesar." From Jordan's statement, *imagining Julius Caesar* was created as a *Process code*. The *Process code reflecting on Hamlet* was generated from Taylor's student interview statement relating to the graveyard, "And it showed us basically i-it was…it was not the most fun scenario to be in for Hamlet and his friend." Both the writing prompt response and the student interview statements reflected knowledge students gained related to the works of William Shakespeare.

Other *In Vivo codes* generated in this category that related to the students' experience of learning within virtual reality included "*easy to learn*," "*it was really cool learning*", and "*I learn better when I'm happier*." Some of the *In Vivo codes* generated in this category dealt with specific elements of the Shakespearean works. For example, "*horse for a kingdom*", "*Yorick was buried*", and "*the people that were plotting*". Examples of *Process codes* that referred to specific characters in the Shakespearean work included *imagining Julius Caesar, describing the action of Cassius*, and *considering the time period*. The following responses found within the qualitative data were used to develop these codes,

Taylor: And then with the education part...it's very e—I would say it's easy to learn, because it's just very straightforward. (Student interview)

Shawn: I also thought it was really cool learning all about stuff. All about Shakespeare and whatnot.

Jordan: And it makes me learn 'cause I learn better when I'm happier.

I could like, see it and like, I could imagine what happened to Julius Caesar. (Student interview)

Kyle: I thought it was sad seeing as his wife died and he kept asking about tomorrow and wondering why she had to die then. (Third week writing prompt response)

The graveyard. It...it helped you realize just the environment of...kind of where Yorick was buried, I believe. (Student interview)

Like there was no secrecy really, except for the people that were plotting, like it was out there. (Student interview)

Chris: One of my fellow class mates said, "Cassius is attempting to change someone's opinion." (First week writing prompt response)

Alex: Like, whenever we went to, like the throne room and stuff, like we could see that, like, there could be like actual kings there back in the day. (Student interview)

The students' comments provide a greater insight of the student perception of learning in virtual reality. Jordan, Kyle, and Chris mention the names of specific characters in the texts being studied. Alex and Kyle's comments both mention specific virtual worlds visited during the course of this study. Kyle's writing prompt response references a specific Shakesperean monologue. This category revealed the features of virtual reality that helped students gain a greater understanding of Shakespearean works. This category, Shakespearean knowledge, was made up of 44 unduplicated codes. See Figure 4.13 for codes generated in this category.

Shakespearean knowledge
knowing information
learning how to do an action
participating in a social and educational experience
"it makes me learn better"
"learning things"
"it was really cool learning"
"learned more about Shakespeare"
"helped you understand"
"I learn better when I'm happier"
"easy to learn"
"very straightforward"
"still educating"
"really easy to understand"
"helps with understanding"
"I knew from the context"
"I knew what point"
"him getting married"
"killing everybody"
"Yorick was buried"
"they were giving eulogies"
"he was mourning his childhood friendds"
"the people that were plotting"
"he kept asking about tomorrow"

Figure 4.13 Examples of codes generated into the Shakespearean knowledge category.

Chapter Summary

This study used both quantitative and qualitative sources to collect data. The Shakespeare Knowledge Assessment and weekly writing prompts were used for quantitative analysis relating to Shakespearean knowledge. The Social Presence section of the Community of Inquiry Survey, the Networked Minds Social Presence Measure, and the Social Presence Survey were used for quantitative analysis relating to social presence. The mean score for the full Social Presence section on the Community of Inquiry was 4.12 (SD = 0.83). The total mean score for the Networked Minds Social

Presence Measure was 4.56 (*SD* = 1.67). Regarding the Social Presence Survey, students tended to feel as if they were "in the same room with the other participants" (*M* = 0.32, *SD* = 0.31). The Social Presence Survey suggested that students felt more neutral about the extent that other students felt "real" in virtual reality (*M* = 0.51, *SD* = 0.20).

Writing Prompts of students as well as interview data was used for the qualitative data analysis. *Structural Coding*, *Emotion Coding*, *In Vivo Coding*, and *Process Coding* were used in order to generate categories. Peer debriefing sessions played an important role in this analysis of qualitative data. Three themes emerged from the qualitative data. The theme relating to students enjoying a common virtual reality experience while developing social cohesion was supported from three categories: enjoyment with virtual reality, engagement in virtual reality, and virtual reality inner mental process. The second theme was based on how virtual reality played a powerful role in helping students develop social bonds. Social presence, student interactions, compare and contrast VR, and avatars were the four categories that supported this theme. The third theme related to how the immersive nature of virtual reality increased students' Shakesperean knowledge. The categories of immersion, action in VR, the arts in virtual reality, traveling in VR, Shakespearean settings in virtual worlds, and Shakesperean knowledge supported this theme.

CHAPTER 5

DISCUSSION, IMPLICATIONS, AND LIMITATIONS

This research sought to examine how a virtual reality innovation would affect both students' knowledge of Shakespeare as well as their social presence. The two research questions that guided this study were 1) How does the implementation of a virtual reality technological innovation affect students' knowledge of Shakespearean works? and 2) How does the implementation of a virtual reality technological innovation affect social presence in students? First, a discussion will reveal how the research questions of this study are answered. Next will be three implications about this research. Finally, the limitations of this study will be reported.

Discussion

Creswell and Creswell (2017) recommend that a discussion section considers the relationship of the results to the research questions. This section analyzes the influence of the virtual reality book club on participants. First, this section presents a discussion of how the virtual reality book club impacted students' Shakespearean knowledge. Then, a discussion of how the virtual reality book club influenced students' social presence will be presented.

How does the implementation of a virtual reality technological innovation affect students' knowledge of Shakespearean works?

This research sought to better understand how using a virtual reality technological innovation affected students' knowledge of Shakespeare. This study suggests that virtual reality can be used to create an engaging experience for students learning about Shakesperean texts. Both qualitative and quantitative data supported that virtual reality could be used to increase students' knowledge of Shakesperean works. Qualitative data suggested that the virtual reality experiences were engaging for students.

Writing prompt responses of this study provided evidence relating to the power of virtual reality in promoting student engagement with Shakespearean works. For example, Chris's writing prompt response following the final *Richard III* virtual reality session revealed the level of engagement created in the theater when students watched animated scenes of Shakespeare. Chris wrote, "One part of the play said 'She is mine, but not for long,' a fellow student gasped at this comment…". Jordan noted in his writing prompt response that "someone gasped because Richard the third said he would marry a girl than [sic] he would kill her." The responses to this writing prompt suggest that both Chris and Jordan experienced noteworthy emotions in virtual reality related to the academic content. Therefore, not only can virtual reality technology generate emotional reactions in users, but virtual reality can also be used to engage students which can impact their academic performance. Past scholarship on Shakespeare has discussed the role of virtual reality in promoting engagement among students (Kraj et al., 2020; Liu et al., 2020). Allcoat and von Mühlenen (2018) also identified a positive correlation between student engagement and academic performance.

One of the major findings of my study regarding the effects of virtual reality related to the immersive nature of the technology in promoting student knowledge of

Shakespeare. This was seen when students spoke about various characters and events in Shakespearean plays that they interacted with in virtual reality and how those experiences helped them understand the works of Shakespeare. For example, Shawn's reflections from their individual interview, "I definitely learned more about Shakespeare than I did before," and "it was really cool learning all about that stuff," provide evidence that the virtual reality book club helped them increase their knowledge of the content. The quantitative data also provided evidence that students' knowledge about Shakespearean works increased because of their virtual reality educational experience. Qualitative data further demonstrated the influence virtual reality offers in teaching Shakespearean literature. For example, Taylor identified in their individual interview response, "it's easy to learn, because it's just very straightforward. 'Cause we only have a few hours to learn a big chunk of stuff. So I think it's very straightforward and to the point, how you're teaching". This further supports other students' perceptions as well about how the virtual reality technological innovation of this study impacted their learning of Shakespearean works.

The converged outcomes of this study align with previous research suggesting that virtual reality can be used as a means of promoting motivation among students learning Shakespeare (Gibson, 1998, as cited in McInnis, 2021). The students in this study connected the virtual worlds with the Shakespearean works content. For example, students visited a graveyard virtual world where an actor spoke lines of Shakespeare relating to Yorick from Shakespeare's *Hamlet.* Students also watched the Pantheon when learning about Julius Caesar. The individual interview comments of Kyle and Jordan

revealed how these students' knowledge about Shakespeare was enhanced through their virtual world experiences,

> Kyle: The graveyard. It helped you realize just the environment of where Yorick was buried, I believe. It helped you see just the environment that he was in whenever he was talking about just how everyone dies and how it sucks that they die.
>
> Jordan: I could like, see it and like, I could imagine what happened to Julius Caesar. And I can imagine him being king and then being killed, like right there. And it helped me, like, understand the environment more. And I could, like, it felt really like interactive. It felt like a field trip and it was like really fun. And everybody else seemed happy about it, too.

Even though the individual interviews were conducted after all the virtual reality sessions had ended, these students were still able to connect specific academic content with the virtual worlds. Both the graveyard and the Pantheon included instruction by the teacher as well as the guest actor reciting Shakespeare. The content discussed in these worlds was further elaborated on in the theater when students watched scenes of Shakespeare. Both Jordan and Kyle connected the virtual worlds with Shakespearean characters: Yorick from *Hamlet* and Julius Caesar from *The Tragedy of Julius Caesar* respectively. These comments demonstrated how virtual reality can help students learn by connecting the content relating to the Shakespearean work with their experiences within specific virtual worlds. Research has been conducted on the relationship between enjoyment and virtual reality in the context of exercise (Mouatt, Smith, Mellow, Parfitt, Smith, & Stanton, 2020). Virtual Reality has been shown to be effective as a tool of promoting positive emotions among users (Pavic, Vergilino-Perez, Gricourt, & Chaby, 2022). This research suggests that virtual reality can promote engagement and enjoyment among students participating in a remote educational experience.

Previous research has suggested that virtual reality environments have been shown to promote motivation among remote learners (Çoban & Goksu, 2022). The idea of using virtual reality and the role of the environment was identified by Pirker and Dengel (2021) as, "...characteristics of virtual reality (VR) like immersion and additional motivation are often emphasized, as this allows learning in environments that are frequently either difficult or impossible to reach" (p. 1). Pirker and Dengel also noted how virtual reality can facilitate learning using virtual reality with "scenarios like a school trip to distant historical sites, to another century or to the moon" (p.1). Virtual reality has been used for traveling to a wide range of places. For example, virtual reality has been used in the scholarship of others for space tourism experiences (Damjanov & Crouch, 2019) and visiting ancient Greece (Bideci & Bideci, 2023). The findings of this research provide evidence that of virtual reality can play an important role in remote education.

In addition, the students engaged in discussions with one another and the teacher within the virtual worlds. Student discussion is an important element in constructivist views of learning (Palincsar, 1998). This research reinforces the importance of the social element when learning about Shakespeare (Cohen, 2018; Gibson, 2016). In this study, the power of virtual reality as a learning tool was found in the outcomes of the qualitative data. When asked about learning Shakespeare through their experience in the virtual reality book club, Kyle responded in their individual interview response,

> Just that it made it a lot easier. Everything was broken down in a way that was really easy to understand. Settings were easy to visualize. Julius Caesar was very

> public…Richard the Third was more like compressed. Even though the figures in it were still public, you know, like it helps you understand the settings of everything. More than just a plain discussion or your teacher just telling you….You could really see all these things that just helped you understand what was going on more.

This response underscores the influence that virtual reality technology has in promoting learning about Shakespeare. The findings of Yu and Xu (2022) further support the idea that virtual reality can be used to promote learning outcomes for users.

The results of the Shakespeare Knowledge Assessment as well as the discussion of specific textual elements in the individual interviews suggest that virtual reality can be used to help students retain information. This is consistent with research on college students in Malaysia studying the English language which provided evidence that virtual reality helped students retain information over time (Dolgunsöz, Yildirim, & Yildirim, 2018). In this study, students demonstrated the capacity to listen and respond to one another in virtual reality when relating to academic content. As Jessie noted in their writing prompt response, "When we were discussing our thoughts, I said something in response to someone else and they agreed". Virtual reality has also been used to help students taking an English course in college improve their listening skills (Jehma & Akaraphattanawong, 2023). Therefore, this study supports previous research in providing evidence that virtual reality can be used as an effective tool for teaching Shakespearean literature (Bushnell & Ullyot, 2022; Lennox & Mason, 2022).

One reason that students might have been able to retain information relating to the Shakesperean works was that the students found the experience to be engaging.

Engagement has been linked with greater academic performance (Allcoat and von Mühlenen, 2018). Since students visited virtual worlds, watched animated scenes, and observed a guest actor doing Shakesperean performances, the students had the opportunity to experience Shakespeare in an engaging way. Visual art and written text were also used in the virtual world of the theater to teach the content. The student discussions also helped students analyze the information together. The idea that virtual reality can be used to motivate learners has been noted in previous academic work on Shakespearean instruction (McInnis, 2021; Psotka, 2021). Augmented reality has also been used to create engagement when studying the work of Shakespeare as well (Bryan, 2021). Past research has been conducted using avatars and Shakespearean literature, having found that onlookers are interested in viewing avatars performing Shakespearean work (Bloom, Kemp, Toothman, & Buswell, 2016). The research findings suggest that virtual reality allowed students to have engaging experiences that promoted content knowledge.

How does the implementation of a virtual reality technological innovation affect social presence in students?

This research examined social presence using both quantitative and qualitative data and should be viewed in the context of past research on virtual worlds and social presence (Burgess et al., 2010; McClannon et al., 2018; Pellas, 2017). In addition, this research can further the scholarship on using virtual reality in an educational context (Holly et al., 2021; Ioannou & Ioannou, 2020). The findings of this study support that virtual reality can result in the growth of social connections, the development of

purposeful and rewarding communication avenues, and the promotion of enjoyable learning experiences for students.

Social connection. There was alignment between the quantitative and qualitative data outcomes in identifying how student engagement within an academic virtual reality setting contributed to compelling social experiences for the students. For example, most of the students interviewed shared that they found it easier to make friends using virtual reality than in the real world. The quantitative data reflected agreement between students that their participation in the virtual reality book club afforded them a sense of belonging and feeling like they established relationships with the other students. These findings correspond with past research using the Community of Inquiry framework showing how participation in virtual worlds can be used to build social presence among learners (Burgess, et al., 2010; McClannon et al., 2018; Pellas, 2017). McClannon et al.'s research (2018) found using a virtual world can be more effective at building social presence than a hybrid model would produce. In analyzing quantitative and qualitative data outcomes, there was an agreement among the students that communicating online provided a strong way to socialize with one another. Thus, this research provides evidence that virtual reality can be used as a way to build social bonds in online environments. This is notable considering the diverse geographic and educational backgrounds of students who participated in this study. This suggests that virtual reality can be used to bridge the gap between students from different walks of life. As Jordan shared in their individual interview response, the experience was "really fun …met lots of friends…from all over the place." Considering the importance of social connection in teenage students' lives (Sarwar, Islam, Mohiuddin, Tareq, & Siddika 2022), these findings offer insight into how

virtual worlds can help students develop social connections with peers in a positive manner. These findings demonstrate that virtual reality helped build social connection among students learning online. Students had the opportunity to interact with one another within the virtual world using avatars. Students explored virtual worlds related to Shakesperean content and participated in discussions together. Thus, this research demonstrates that virtual reality was able to create a social learning experience.

Communication. The collaborative power of technology has been a motivating factor in past research on virtual reality (Kavanagh et al., 2017). In this study, lines of Shakespeare and the concepts of choice and destiny were topics of academic discussion within the virtual reality settings. Both quantitative and qualitative data findings demonstrated that students felt the group dialogues helped them gain a feeling of collaboration and facilitated verbal interactions with other students. Students were found to be joking, laughing, writing out statements, and using emojis when participating in virtual reality. Individual interview responses also provided evidence that virtual reality can be used to help students feel comfortable participating in dialogue and having conversations during remote learning. For example, Jordan shared the excitement they felt talking to other students in virtual reality, "So it felt fun knowing that there was like some people that have the same interest as me. And I just felt really, like, excited talking to all the other kids and it was really interesting." These findings demonstrate the power of technology to facilitate communication in a remote learning environment. These findings also demonstrate how virtual reality can make communicating with other students in online learning environments exciting. These findings suggest that virtual worlds—such as the theater in Bigscreen or the various virtual worlds used in VRChat—

allowed students to communicate with one another in a positive manner. Quest 2 headsets were an effective technology at facilitating these experiences for students. Thus, these findings suggest that virtual reality promoted communication among students participating in remote learning.

Enjoyment. The research of Barreda-Ángeles and Hartmann (2022) has suggested that the level of social presence students feel predicts how much they enjoy virtual reality. Gorard and See (2011) also provided evidence that a student's enjoyment of school is related to the social element of education. The outcomes of this research further these scholars' perspectives in identifying the students' elevated levels of enjoyable experiences from their participation in the virtual reality book club activities. The enjoyment of students was one of the most salient features of the qualitative data. Students noted the happiness and fun they felt participating in this research. For example, Jessie mentioned in their writing prompt response that "When someone would say or do something funny, it would make me feel happier."

The capacity of virtual reality to foster student enjoyment was found in the research of Kavanagh et al. (2017). The research of Sriworapong, Pyae, Thirasawasd, and Keereewan (2022) also showed that learning online in a 2-D environment promoted student enjoyment. The findings of this research demonstrate that 3-D virtual worlds can contribute to student enjoyment which can further the outcomes of Hagenauer and Hascher (2014) who found positive student emotional states can impact academic achievement. The findings of this study demonstrate that virtual reality can be an enjoyable experience for students. Students could explore worlds related to Shakesperean content together as well as view animated scenes from Shakespeare in a theater. Students

could also discuss the texts together. Virtual reality provided a powerful tool for socialization for students participating in online educational experiences.

Implications

Past scholarship has recommended to include implications for both academic inquiry and as a means of furthering the knowledge of others in the field (Creswell & Creswell, 2017). The implications offered by this research are applicable to my own teaching, to other educators who use or are considering using virtual reality in their learning environments, as well as to researchers in the field of education technology. This section discusses personal implications, professional implications, and implications for future research.

Personal Implications

This research provided me the opportunity to gain experience conducting research on students learning in virtual reality. Three aspects of this research demonstrate the power of virtual reality in facilitating remote learning experiences: the value of social bonds, the power of peer imitation, and the importance of student discussions. Virtual reality has been shown to promote social presence for students while participating in online learning (Barreda-Ángeles, Horneber, & Hartmann, 2023). Virtual reality has also been shown to promote imitation among users (Fox, Bailenson, & Binney, 2009). The use of virtual worlds to promote weekly class discussions has been supported by past scholarship (Jarmon, Traphagan, Mayrath, & Trivedi, 2009). All three of these components regarding virtual reality on remote learning experiences of Shakespeare were important elements of the virtual reality book club this study analyzed.

One major finding of this study was the number of students that found making friends in virtual reality to be easier than in real life. This suggests that interactive virtual reality environments can be a valuable tool in helping students develop social skills and form friendships when engaged in online learning experiences. Past research has provided evidence for virtual reality being able to create enjoyable experiences for students learning academic content (Bennett & Saunders, 2019; Jehma & Akaraphattanawong, 2023). Past research has also shown that virtual reality can promote academic achievement (Cahyadi, Wardhana, & Ansori, 2022; Liu, Wang, Koszalka, & Wan, 2022). This study provides further evidence that virtual reality–including the applications VRChat and Bigscreen–can be used to promote enjoyment while participating in virtual learning activities. Expanding on this important finding is a discussion of the impact of virtual reality experiences on introverted students, peer imitation, and discussions within the online environment.

Introverted students. Students participating in the virtual reality book club had opportunities to interact with one another in different virtual worlds. Virtual environments have been found to be helpful for introverted students (van den Berg, Hartmann, & de Graaf, 2017). This should be viewed within the context of research showing a correlation between introversion and feelings of loneliness (Buecker, Maes, Denissen, & Luhmann, 2020). When using virtual reality to help improve writing skills, Khodabandeh (2022) found virtual reality to be helpful in addressing the learning needs of students classified as being introverted. In addition, besides academic improvement, Hutson (2022) suggested that virtual reality can be used to help individuals who have trouble with social engagement. Kyle stated during their individual interview that the

virtual reality book club helped another student become more social, “It made people come out of their shell a lot more. Especially because me and [Jessie] were in here together. Typically [Jessie] is really sad—shy—but [they were] really outspoken. It's just I noticed a real change in confidence…” This “change in confidence” might be one of the most important reasons to help more students participate in online learning using virtual reality. Evidence suggests that schools can implement interventions to reduce shyness among students (Cordier et al., 2021). A virtual reality book club can be used as a tool to improve students’ social skills. Therefore, the impact of virtual reality on social and academic skills demonstrated in this study may have large implications for helping introverted students participating in online learning.

Peer imitation. The role of peer imitation was also seen in this research. Past scholarship has noted that individuals participate in imitation within virtual worlds (Smith & Berge, 2009). The selection of clothing and hairstyles has been analyzed as relating to peer imitation (Johnson, 1981). Indeed, clothing is used by teenagers to show that they are similar to other people who wear similar clothes (Piacentini & Mailer, 2004). Some research has suggested that there can be negative effects from certain school uniform policies (Reidy, 2021). Yet the fact that students choose to select clothing based on their peers may suggest that students desire a certain amount of uniformity. This research demonstrates that students’ avatar selection can also demonstrate peer imitation in a virtual world. For example, several students turned into the same floating creature while on the farm. In the Victorian house, several students became the same cartoon character. Alex noted in their individual interview response that “when one avatar would go to…the picnic area, like other avatars would probably follow in them. And they would

go there, too ". Jessie noted in their writing prompt response, "In the theater, when other people would move around, I would follow them." Both these pieces of qualitative data are consistent with peer imitation. Past research has also been conducted on peer imitation and education. Zhou and Guo (2016) concluded that undergraduate students perceive imitation to influence learning in an educational context. Scholarship has argued that imitation is about students trying to find a sense of belonging in a group (Over & Carpenter, 2013). Thus, peer imitation can be interpreted as being related to the social dynamics of a student's virtual learning experience.

Discussions. The third important aspect to consider regarding virtual reality experiences is student discussions. Research has suggested that student silence is a problem in online education (Ho, Sa'adi, He, & Hoon, 2023). To promote student discussion in an online environment, Beeman (2022) suggests using the breakout room feature. Breakout rooms are a feature of various videoconferencing services and have been highlighted for their role in remote learning (Naik & Govindu, 2022). The findings of this research are aligned with existing scholarship demonstrating how remote students can experience greater social presence than in-person students (Alman, et al., 2012; Wu, et al., 2017). This study provides evidence that virtual reality can be a tool to promote student discussion. Being an active participant in this virtual reality study, I, as the researcher and teacher, consider the final discussion to be an important part of the virtual reality book club. In the final discussion, I offered prompts and comments to the students related to the role of choice and destiny when discussing Shakespearean works. This discussion provided evidence that students could participate in an abstract discussion connected with the content being learned in virtual reality. This discussion also

demonstrated the key role student discussions can bring to virtual reality learning. Shawn and Kyle both shared responses in their writing prompt responses and individual interviews regarding this final discussion, supporting the quality of this last discussion topic.

> Shawn: I could tell how [Kyle] was feeling whenever [they] did say things on destiny or whenever we talked about choice or destiny.
>
> Kyle: I think our last discussion was a really big representation of just the overall environment. You know, where we talked about choice versus destiny. I feel like that was just a really good example of how open the discussions were. And how even though we all had different opinions of all these things we read about, or like...[laughs] you know, experienced, it's just...it showed that everyone had different opinions, but we still felt safe. Or, I guess, like, we felt more comfortable sharing them.

This virtual reality book club intervention study provided this researcher with the opportunity to organize an educational experience that promoted social bonds, peer imitation, and student discussion. I plan to share with other educators and researchers in the field the benefits of virtual reality on student learning and social presence.

Professional Implications

The implications of this research for remote education are important. This research demonstrates that virtual reality headsets and virtual worlds can be used to create an academic and social experience for students. Some students have expressed negative attitudes toward videoconferencing in remote education (Vandenberg & Magnuson, 2021). It should be noted that videoconferencing was used as a tool to help aid this study. However, this study provides compelling evidence that alternative technology can also be incorporated in remote learning. Childs et al. (2023) have questioned whether virtual reality is ready for widespread adoption as a tool of remote

learning, criticizing the lack of customization. The findings of this study suggest that it is possible to create virtual reality educational experiences using virtual worlds to illustrate various academic concepts. For example, students sat in an amphitheater in Ancient Rome and watched an actor perform a passage from *The Tragedy of Julius Caesar*. Students had the opportunity to visit a throne room when learning about *Macbeth* and *Richard III*. Students had the opportunity to watch animated portions of Shakespearean works in virtual reality, hear Shakespearean monologues, and view art based on Shakespeare's plays. This research suggests that if more students had virtual reality educational experiences offered to them, including access to virtual reality headsets and virtual worlds, powerful academic and social experiences could be developed.

In research on asynchronous instruction, it has been found that students will post less in-depth discussion responses as class sizes increase (Pilotti, Anderson, Hardy, Murphy & Vincent, 2017; Susak, 2016). Additionally, organizing an online educational experience so that students are learning in a smaller group is associated with greater social presence (Akcaoglu & Lee, 2016; Poquet et al., 2018). It is possible that the fewer virtual reality book club participants supported the higher level of discussions that took place. Even when all students were in proximity within the virtual world, the number of students together was fewer than the average class size of schools within South Carolina (National Center for Education Statistics, n.d.). The number of participants should be considered when considering the role of communication in the virtual reality experience. This research also has implications for the teaching of Shakespeare in particular. Shakespeare is part of the Common Core Standards (Common Core State Standards Initiative, n.d.). There is evidence many students do not find Shakespeare to be an

engaging author. Ramnanan (2013) cited research conducted by the Centre for Educational Development, Appraisal, and Research at the University of Warwick (Strand, 2009) noting that 46% of students surveyed found learning about Shakespeare to be boring. Bloom's (2016) description of research conducted by Discovering Literature at the British Library found the majority of teachers surveyed perceived Shakespeare's works to be uninspiring for students. Teachers also expressed the sentiment that students find Shakespeare to be difficult to connect with (Bloom, 2016). This suggests a lack of engagement with Shakespearean works. However, past research has suggested that augmented reality and technology such as immersive filming can promote student engagement in Shakespearean works (Bryan, 2021; McInnis, 2021). Research has also shown that virtual reality can increase student engagement (Allcoat & von Mühlenen, 2018; Kraj, et al., 2020; Liu, et al., 2020). The technology used in this study was found to engage students in both virtual worlds and animated scenes of Shakespeare. While the converged quantitative and qualitative data supported students to find the virtual reality book club to be engaging and enjoyable, the individual interview responses of Kyle, Shawn, Jordan, and Taylor accentuated these findings,

> Kyle: I feel like this is a great way to make friends. I feel like this is a great way to learn about things. Like I said, it's very hard for me to visualize settings and stuff. So it helped me understand the placement of different things and all that…I feel like it helped in a lot of ways, including just making it easier to talk about how you felt and talk about your opinions.
>
> Shawn: I also thought it was really cool learning all about stuff. All about Shakespeare and whatnot.
>
> Jordan: …It felt like much more interactive, 'cause I could see how everything looked, and it was much more funner. I usually thought of Shakespeare as boring or reading books, but, like, when I can see everything...that made it much better.

Taylor: …I think it was fun doing the VR learning 'cause like I said, you get to meet new people. And then with the education part...I think it's very straightforward and to the point, how you're teaching.

These responses support that technology can be a large part of the experience of learning about the works of William Shakespeare. In addition, this research demonstrates that virtual reality headsets and virtual worlds can be used to promote learning about Shakespearean works. A strength of this research design was the ability to bring in an actor performing a Shakespeare monologue in a virtual world. Suggestions for educators would be to include students performing scenes within virtual worlds. Students could also learn about sources that informed Shakespeare's own works. For example, Shakespeare used Plutarch as a source for several of his works (Honigmann, 1959). Shakespeare also alluded to Virgil, Ovid, and the Bible (Hamlin, 2013). Thus, Shakespeare can be used to discuss numerous texts with students and virtual worlds could be used to further the connection with the texts being studied.

This research also has implications for social presence in the context of online education. Research has shown that a sense of social isolation can be present among online learners (Priyadarshini & Bhaumik, 2020). However, the use of synchronous interaction in remote learning has been shown to promote a sense of belonging in students (Peterson, Beymer, & Putnam, 2018). Social isolation can contribute to mortality (Naito et al., 2023). Teachers who wish to teach in virtual reality may benefit from considering the value of social bonds, the power of peer imitation, and the importance of student discussions when planning their own instruction using virtual reality headsets and virtual worlds. If more students had access to virtual reality headsets as tools for remote

instruction, then it is plausible many students would form friendships and deepen social connection with one another when participating in virtual reality educational experiences.

Implications for Future Research

The research on virtual worlds by Won, Bailey, and Yi (2019) included guest speakers within an undergraduate online classroom setting with their results showing some students felt enthusiastic about the experience. The actor who performed Shakespeare in this study contributed to the study by being a guest for several of the sessions. Future studies could include a variety of different guests. For example, a scholar who studies the Elizabethan age might be an appropriate guest when studying Shakespearean works. Virtual reality could also be used to connect students with individuals with knowledge appropriate to the subject matter. Past research has demonstrated that educational experiences can include both virtual field trips and recordings of experts on specific knowledge (Poor & Vasconcelos, 2023). This research suggests that virtual field trips and a guest speaker can be part of remote learning experiences. Virtual reality headsets and virtual worlds for students learning at home with parallel experiences, including the role and importance of a guest, is an area of future research being recommended.

Future longitudinal research could include students using virtual reality technology for an entire school year. It is even plausible that some students would want to continue to participate in such a program for multiple years. Using the same virtual reality book club research design as offered in this study, but extending the duration and repeated measured data relating to the social bonds being developed would contribute

well to the existing literature on social presence within remote learning (Mystakidis et al., 2021).

Scholarship has suggested that the cost of virtual reality headsets and motion sickness are challenges relating to the use of virtual reality in education (Childs et al., 2023; Mayne & Green, 2020). Although this research focused on students using virtual reality headsets, a mixture of virtual reality headsets and personal computers could be used for future research. For example, some students could access the virtual world on a computer while others access it on a headset. The cross-platform nature of VRChat makes it a good fit for such a purpose (VRChat Inc., 2023). For example, although the actor used a virtual reality headset most of the time for his performances, he also used a personal computer. This provides evidence that a virtual reality guest can use a computer to interact with students using headsets. However, an interesting avenue for future research would be to compare the social presence of students who participated through a personal computer with students who participated through a virtual reality headset.

Future research that I look forward to pursuing and would encourage others in the field to also research should examine the video/audio recordings of students while participating in virtual reality experiences. As an observational study, "Video recording provides a high degree of reproducibility when measuring observations. Unlike real-time data collection, video recordings can be re-played any number of times" (Haidet, Tate, Divrgilio-Thomas, Kolanowski, & Happ, 2009, p.2). On the other hand, video recordings do have limitations when used for research (Latvala, Vuokila-Oikkonen, & Joanhonen, 2000). Under this framework, how the personalized use of avatars in the virtual reality experience could specifically be analyzed. The depth of information regarding the

community of inquiry model (Kozan & Richardson, 2014) relating to the social presence of students, the influence of teacher presence, and how cognitive presence is evaluated and demonstrated would further the existing scholarship in this area using virtual reality technology.

Limitations

There were limitations of this study that also need to be considered. One limitation is that the sample size was small. A small sample size is not optimal for the validity of the research (Faber & Fonseca, 2014). Another limitation was that this sample of students had educational backgrounds all situated within South Carolina. There is evidence that South Carolina is not an average state in terms of Pre-K-12 education. Indeed, South Carolina has been ranked #40 in terms of Pre-K-12 education (U.S. News, 2023). Studying different geographical areas could have revealed cultural information that was otherwise not found in this study. Virtual reality affords a researcher the ability to conduct educational research with students from other countries and continents. Another limitation of this study is the use of convenience sampling in recruiting students (Olibor, 2023). The students' interest in virtual reality might be skewed since personal connections of the researcher were an element of recruitment. If some of the students were had a particular interest in virtual reality, then that might skew the quantitative and qualitative results in a positive manner. The poor reliability of the Community of Inquiry survey data is another limitation of this study.

Another limitation of this study was not including the recordings of the student discussions as a part of the qualitative data studied. After discussion with my dissertation committee, it was decided not to analyze the audio/video recordings of each virtual

reality book club session as it would extend beyond the scope of doctoral dissertation expectations. An observational study using video/audio recordings of students learning in virtual reality could be a future opportunity to study this technology in relation to online instruction.

Conclusion

This research focused on teaching Shakespeare using virtual reality as a tool for remote learning. Both the social presence of students as well as their knowledge of Shakespeare was analyzed after an educational intervention. Students visited various virtual worlds related to Shakespearean works using Quest 2 virtual reality headsets. While participating in remote learning, students used these headsets to interact with one another, a teacher, and a guest actor who performed Shakespearean monologues. VRChat provided students from different educational backgrounds the chance to travel together to various virtual worlds related to the settings in the texts–such as Ancient Rome, a throne room, a cemetery, a fifteenth-century style cathedral, and more. Bigscreen allowed students to view and discuss animated scenes of Shakespearean works in a theater with one another. Bigscreen also allowed the teacher to present written text and visual art relating to the academic content. The guest actor visited the students in various virtual worlds to recite passages of Shakespeare. The outcomes of both quantitative and qualitative data supported the use of virtual reality for both facilitating social presence as well as improving Shakespearean knowledge in a remote learning environment. The quantitative findings that showed the use of virtual reality facilitated social presence among students participating in an online learning environment. In addition, this research suggests that virtual reality can help students build stronger social bonds than during in-

person instruction. This was further supported by the qualitative findings that provided evidence that virtual reality helped students find Shakespeare to be fun and enjoyable and that students often experienced robust social presence within virtual reality. Many of the students interviewed stated that they found it easier to make friends in virtual reality than in the real world. Educators should consider the use of virtual reality tools to make learning Shakespeare more engaging. Additional research is recommended on both the social and academic elements of virtual reality learning.

REFERENCES

Abuzandah, S. (2020). Social skills for homeschooling students. *Creative Education, 11*(7), 1064-1072.

Action Menu. (n.d.). Retrieved from https://docs.vrchat.com/docs/action-menu

Academic Achievement (2023). Retrieved from https://screportcards.com/overview/academics/academic-achievement/details/?q=eT0yMDIyJnQ9RCZzaWQ9MzgwOTAwMA

Akcaoglu, M., & Lee, E. (2016). Increasing social presence in online learning through small group discussions. *The International Review of Research in Open and Distributed Learning, 17*(3), 1-17.

Allcoat, D., & von Mühlenen, A. (2018). Learning in virtual reality: Effects on performance, emotion and engagement. *Research in Learning Technology*, *26*, 1-13.

Alman, S., Frey, B., & Tomer, C. (2012). Social and cognitive presence as factors in learning and student retention: an investigation of the cohort model in an iSchool setting. *Journal of Education for Library and Information Science*, *53*(4), 290-302.

Amineh, R. J., & Asl, H. D. (2015). Review of constructivism and social constructivism. *Journal of Social Sciences, Literature and Languages*, *1*(1), 9-16.

Anfara, V.A., Jr. (2008) Visual data displays. In L.M. Given (Ed.), The Sage encyclopedia of qualitative research methods (Vol 2, pp. 930-4). Thousand Oaks, CA: Sage.

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *The Internet and Higher Education, 11*(3-4), 133-136.

Azano, A. P., Callahan, C. M., Brodersen, A. V., & Caughey, M. (2017). Responding to the challenges of gifted education in rural communities. *Global Education Review, 4*(1), 66- 72.

Bailey, J. O., & Bailenson, J. N. (2017). Considering virtual reality in children's lives. *Journal of Children and Media, 11*(1), 107-113.

Baldwin, S. J. & Trespalacios, J. (2017). Evaluation instruments and good practices in online education. *Online Learning, 21*(2), 1-18. doi: 10.24059/olj.v21i2.913

Barreda-Ángeles, M., & Hartmann, T. (2022). Psychological benefits of using social virtual reality platforms during the covid-19 pandemic: The role of social and spatial presence. *Computers in Human Behavior, 127*, 1-13.

Barreda-Ángeles, M., Horneber, S., & Hartmann, T. (2023). Easily applicable social virtual reality and social presence in online higher education during the covid-19 pandemic: A qualitative study. *Computers & Education: X Reality, 2*, 1-13.

Barteit S, Lanfermann L, Bärnighausen T, Neuhann F, Beiersmann C. (2021). Augmented, mixed, and virtual reality-based head-mounted devices for

medical education: Systematic review. *JMIR Serious Games*, 9(3), 1-18. doi: 10.2196/29080

Bass, E. L. (2019). *Examining a place-based curriculum for high-performing learners: A place-based, critical, dialogic curriculum for high-performing rural writers* (Doctoral dissertation). Retrieved from Virginia Tech.

Beeman, K. L. (2022). The quiet girl in a virtual world: Learning from the virtual classroom to better support quiet girls in the middle grades. *RMLE Online*, *45*(7), 1-19.

Bennett, J. A., & Saunders, C. P. (2019). A virtual tour of the cell: Impact of virtual reality on student learning and engagement in the STEM classroom. *Journal of Microbiology & Biology Education*, *20*(2), 1-3.

Boston, W., Díaz, S. R., Gibson, A. M., Ice, P., Richardson, J., & Swan, K. (2009). An exploration of the relationship between indicators of the community of inquiry framework and retention in online programs. *Journal of Asynchronous Learning Networks, 13*(3), 67-83.

Bideci, M., & Bideci, C. (2023, January). Back in Time with Immersive Heritage Tourism Experience: A Study of Virtual Reality in Archaeological Sites. In *Information and Communication Technologies in Tourism 2023: Proceedings of the ENTER 2023 eTourism Conference, January 18-20, 2023* (pp. 312-317). Cham: Springer Nature Switzerland.

Bigscreen. (n.d.). Retrieved from https://www.bigscreenvr.com/

Biocca, F., Harms, C., & Gregg, J. (2001, May). *The networked minds measure of social presence: Pilot test of the factor structure and concurrent validity.* Paper

presented at the Fourth Annual International Workshop on Presence, Philadelphia, Pennsylvania.

Biocca, F., & Harms, C. (2002). Defining and measuring social presence: Contribution to the networked minds theory and measure. In *Proceedings of the Fifth Annual International Workshop on Presence,* Portugal, (pp. 1-36).

Blaine, A. M. (2019). Interaction and presence in the virtual classroom: An analysis of the perceptions of students and teachers in online and blended advanced placement courses. *Computers & Education, 132,* 31-43.

Blascovich, J., Loomis, J., Beall, A. C., Swinth, K. R., Hoyt, C. L., & Bailenson, J. N. (2002). Immersive virtual environment technology as a methodological tool for social psychology. *Psychological inquiry, 13*(2), 103-124.

Bloom, A. (2016, March 15). Pupils struggle to relate to Shakespeare, survey finds. Tes Magazine. Retrieved from https://www.tes.com/magazine/archive/pupils-struggle-relate-shakespeare-survey-finds

Bloom, G., Kemp, S., Toothman, N., & Buswell, E. (2016). "A whole theater of others": Amateur acting and immersive spectatorship in the digital Shakespeare game Play the Knave. *Shakespeare Quarterly, 67*(4), 408-430.

Brewer, J., & Hunter, A. (1989). *Multimethod research: A synthesis of styles* (1st ed.). Newbury Park, CA: Sage Publications, Inc.

Broussard, S. C., & Garrison, M. B. (2004). The relationship between classroom motivation and academic achievement in elementary-school-aged children. *Family and Consumer Sciences Research Journal, 33*(2), 106-120.

Brown, K.M. (1999) Creating community in middle schools: Interdisciplinary teaming and advisory programs. Unpublished doctoral dissertation, Temple University.

Bryan, E. (2021). What can Shakespeare do for virtual reality? In Wittek, S., & McInnis, D. (Eds.), *Shakespeare and virtual reality (elements in Shakespeare and pedagogy).* Cambridge: Cambridge University Press.

Buecker, S., Maes, M., Denissen, J. J., & Luhmann, M. (2020). Loneliness and the Big Five personality traits: A meta–analysis. *European Journal of Personality, 34*(1), 8-28.

Bulu, S. T. (2012). Place presence, social presence, co-presence, and satisfaction in virtual worlds. *Computers & Education, 58*(1), 154–161.

Burgess, M. L., Slate, J. R., Rojas-LeBouef, A., & LaPrairie, K. (2010). Teaching and learning in Second Life: Using the Community of Inquiry (CoI) model to support online instruction with graduate students in instructional technology. *The Internet and Higher Education, 13*(1-2), 84-88.

Bushnell, R. W., & Ullyot, M. (2022). Shakespeare and Virtual Reality. In *The Routledge Handbook of Shakespeare and Interface* (pp. 29-43). New York, NY: Routledge.

Cahyadi, P., Wardhana, D. I. A., Ansori, W. I., & Farah, R. R. (2022). Enhancing students' English speaking ability through VRChat game as learning media. *Journal of Research on Language Education, 3*(2), 54-61.

Cameron, R. (2011). Mixed methods research: The five Ps framework. *Electronic Journal of Business Research Methods, 9*(2), 96-108.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*(2), 81-105.

Carpenter, D., & Gann, C. (2016). Educational activities and the role of the parent in homeschool families with high school students. *Educational Review, 68*(3), 322-339.

Castellanos-Reyes, D. (2020). 20 years of the community of inquiry framework. *TechTrends, 64*(4), 557-660.

Cecotti, H. (2022). Cultural Heritage in Fully Immersive Virtual Reality. *Virtual Worlds, 1*(1), 82–102.

Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin, 140*(4), 980-1008.

Chambers, C., Crumb, L., & Harris, C. (2019). A call for dreamkeepers in rural United States: Considering the postsecondary aspirations of rural ninth graders. *Theory & Practice in Rural Education*, *9*(1), 7-22.

Chan, S. W., Ismail, Z., & Sumintono, B. (2016). Assessing statistical reasoning in descriptive statistics: A qualitative meta-analysis. *Jurnal Teknologi, 78*(6-5).

Champness, B. G. (1973). The assessment of user reactions to confravision: II. Analysis and conclusions. *Communication Studies Group Report* (EI73250/CH). *London: University College London*.

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. Sage Publications.

Childs, E., Mohammad, F., Stevens, L., Burbelo, H., Awoke, A., Rewkowski, N., & Manocha, D. (2023). An overview of enhancing distance learning through emerging augmented and virtual reality technologies. IEEE Transactions on

Visualization and Computer Graphics. ArXiv. https://doi.org/10.48550/arXiv.2101.1100

Çoban, M., Bolat, Y. I., & Goksu,İ. (2022). The potential of immersive virtual reality to enhance learning: A meta-analysis. *Educational Research Review*, 100452.

Cohen, R. A. (2018). *ShakesFear and how to cure it: The complete handbook for teaching Shakespeare*. Bloomsbury Publishing.

Common Core State Standards Initiative (n.d.). English Language Arts standards. https://www.thecorestandards.org/ELA-Literacy/RL/11-12/

"Common Core State Standards For English Language Arts" (2010). https://learning.ccsso.org/wp-content/uploads/2022/11/ELA_Standards1.pdf

Cordier, R., Speyer, R., Mahoney, N., Arnesen, A., Mjelve, L. H., & Nyborg, G. (2021). Effects of interventions for social anxiety and shyness in school-aged children: A systematic review and meta-analysis. *Plos one*, *16*(7), 1-42.

Costea, F. M., Chirila, C. B., & Cretu, V. I. (2018, April). *E-learning in the era of virtual reality.* Paper presented at the 14th International Scientific Conference on eLearning and Software for Education, Bucharest, Romania.

Cowden, P.A., DeMartin, J., & Lutey, W. (2006). Stepping inside the classroom: A look into virtual field trips and the constructivist educator. *Journal for the Practical Application of Constructivist Theory in Education, 1*(1), 1-8.

Creswell, J. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Thousand Oaks, CA: Sage Publications.

Creswell, J. W., & Báez, J. C. (2020). *30 essential skills for the qualitative researcher*. Thousand Oaks, CA: Sage Publications.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Los Angeles, CA: Sage Publications.

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (5th ed.). Los Angeles, CA: Sage Publications.

Creswell, J. W., & Creswell, J.D. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage Publications.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.) Thousand Oaks, CA: Sage Publications.

d'Alessio, M. A., Lundquist, L. L., Schwartz, J. J., Pedone, V., Pavia, J., & Fleck, J. (2019). Social presence enhances student performance in an online geology course but depends on instructor facilitation. *Journal of Geoscience Education, 67*(3), 222-236.

Dakin, M. E. (2009). *Reading Shakespeare with young adults*. National Council of Teachers.

Dale, E. (1946). *Audio-visual methods in teaching*. New York, NY: The Dryden Press.

Dallavis, J. W., & Berends, M. (2023). Charter schools after three decades: Reviewing the research on school organizational and instructional conditions. *Education Policy Analysis Archives, 31*(1), 1-30.

Damjanov, K., & Crouch, D. (2019). Virtual reality and space tourism. In *Space Tourism* (Vol. 25, pp. 117-137). Emerald Publishing Limited.

Data files. (n.d). Retrieved from https://screportcards.ed.sc.gov/files/2019//data-files/

Delecroix, E. (1935). *Hamlet and Horatio in the Graveyard* [Painting]. The Metropolitan Museum of Art, New York, NY, United States. https://www.metmuseum.org/art/collection/search/702200

Denzin, N. (1978). *The research act* (2nd ed.). New York, NY: McGraw-Hill.

Department of Health and Human Services. Retrieved from https://data.hrsa.gov/tools/rural-health

Dewey, J. (1997). *Experience and Education.* New York: NY: Touchstone.

Dias, P., Silva, R., Amorim, P., Lains, J., Roque, E., Serôdio, I., Pereira, F., & Santos, B. S. (2019). Using virtual reality to increase motivation in poststroke rehabilitation. *IEEE Computer Graphics and Applications, 39*(1), 64-70.

Dickey, M. D. (2003). Teaching in 3D: Pedagogical affordances and constraints of 3D virtual worlds for synchronous distance learning. *Distance Education, 24*(1), 105-121.

Driscoll, M. P. (2005). *Psychology of learning for instruction*. Pearson.

Dodson, Braley (2022). South Carolina's homeschool surge more than just a blip, data shows. https://www.wbtw.com/news/state-regional-news/south-carolinas-homeschool-surge-more-than-just-a-blip-data-shows/

Dolgunsöz, E., Yildirim, G., & Yildirim, S. (2018). The effect of virtual reality on EFL writing performance. *Journal of Language and Linguistic Studies, 14*(1), 278-292.

Domingo, J. R., & Bradley, E. G. (2018). Education student perceptions of virtual reality as a learning tool. *Journal of Educational Technology Systems, 46*(3), 329-342.

Donovan, E. (2016). Learning the language of home: Using place-based writing practice to help rural students connect to their communities. *The Rural Educator*, *37*(2), 1-12.

Earle, S. (2019). *Assessment in the primary classroom: Principles and practice*. London, United Kingdom: Learning Matters.

Faber, J., & Fonseca, L. M. (2014). How sample size influences research outcomes. *Dental Press Journal of Orthodontics*, *19*(4), 27-29.

Feyzi Behnagh, R., & Yasrebi, S. (2020). An examination of constructivist educational technologies: Key affordances and conditions. *British Journal of Educational Technology*, *51*(6), 1907-1919.

Figg, C., Wenrick, M., Youker, C., Heilman, J., & Schneider, C. (2010). Implications and benefits of a long-term peer debriefing experience on teacher researchers. *Brock Education Journal*, *19*(1), 20-35.

Finch, P. A. (2016). Teacher-created student growth assessments used for teacher evaluation and the effects on teacher efficacy (Doctoral dissertation). National University, Chicago.

Fink, A. (1995). *How to Analyze Survey Data.*

Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2019). The impact of virtual, augmented and mixed reality technologies on the customer experience. *Journal of Business Research*, *100*, 547-560.

Fowler, F. J. (2013). *Survey research methods*. Thousand Oaks, California: Sage Publications.

Fox, J., Bailenson, J., & Binney, J. (2009). Virtual experiences, physical behaviors: The effect of presence on imitation of an eating avatar. *Presence: Teleoperators and Virtual Environments, 18*(4), 294-303.

Freeman, G., & Maloney, D. (2021). Body, avatar, and me: The presentation and perception of self in social virtual reality. *Proceedings of the ACM on human-computer interaction, 4*(CSCW3), 1-27.

Gagnon, D. J., & Mattingly, M. J. (2016). Advanced placement and rural schools: Access, success, and exploring alternatives. *Journal of Advanced Academics, 27*(4), 266-284.

Garcia-Ruiz, M. A., Edwards, A., El-Seoud, S. A., & Aquino-Santos, R. (2008). Collaborating and learning a second language in a wireless virtual reality environment. *International Journal of Mobile Learning and Organisation, 2*(4), 369-377.

Garrison, D. R. (2009). Communities of inquiry in online learning. In P. Rogers, G. Berg, J. Boettcher, C. Howard, L. Justice, & K. Schenk (Eds.), *Encyclopedia of distance learning (2nd ed.,* pp. 352-355). IGI Global. https://doi.org/10.4018/978-1-60566-198-8.ch052

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2-3), 87-105.

Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the community of inquiry framework: A retrospective. *The Internet and Higher education, 13*(1-2), 5-9.

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education*, *10*(3), 157-172.

Gibson, R. (1998). *Teaching Shakespeare*. Cambridge University Press. Cambridge, England.

Gibson, R. (2016). *Teaching Shakespeare* (2nd ed.). Cambridge University Press. Cambridge, England.

Girvan, C. (2018). What is a virtual world? Definition and classification. *Educational Technology Research and Development*, *66*(5), 1087-1100.

Google Arts and Culture. (n.d.) *Hamlet: Act IV, Scene V (Ophelia and Laertes).* https://artsandculture.google.com/asset/hamlet-act-iv-scene-v-ophelia-and-laertes-benjamin-west-american-b-1738-d-1820/uQED60DaNg7l6w?hl=en

Glewwe, P., & Levin, M. (2005). Presenting simple descriptive statistics from household survey data. Household Sample Surveys in Developing and Transition Countries, 335-354.

Goehle, G. (2018). Teaching with virtual reality: Crafting a lesson and student response. *International Journal for Technology in Mathematics Education*, *25*(1), 35-45.

Goldmark, P. C. (1972, May). *The new rural society*. Paper presented at the National Cable Television Association Annual Convention, Chicago, IL.

Graham, S. E., & Teague, C. (2011). Reading levels of rural and urban third graders lag behind their suburban peers. *Carsey Institute, 28*, 1-4.

Grissom, J. A., Redding, C., & Bleiberg, J. F. (2019). Money over merit? Socioeconomic gaps in receipt of gifted services. *Harvard Educational Review*, *89*(3), 337-369.

Gorard, S., & See, B. H. (2011). How can we enhance enjoyment of secondary school? The student view. *British Educational Research Journal*, *37*(4), 671-690.

Gungor, A., Kool, D., Lee, M., Avraamidou, L., Eisink, N., Albada, B., van der Kolk, K., Tromp, M., G., & Bitter, J. J. H. (2022). The use of virtual reality in a chemistry lab and its impact on students' self-efficacy, interest, self-concept and laboratory anxiety. *EURASIA Journal of Mathematics, Science and Technology Education*, *18*(3), 1-13.

Gunter, G. A., Braga, J. D. C. F. B. F., & Reeves, J. L. (2019). Examining social, cognitive and teaching presences in an online teacher development course using WhatsApp and community of inquiry. *FDLA Journal*, *4*(1), 1-13.

Hackett, M., & Proctor, M. (2016). Three-dimensional display technologies for anatomical education: A literature review. *Journal of Science Education and Technology*, *25*(4), 641-654.

Hagenauer, G., & Hascher, T. (2014). Early Adolescents' Enjoyment Experienced in Learning Situations at School and Its Relation to Student Achievement. *Journal of Education and Training Studies*, *2*(2), 20-30.

Hagenauer, G., Hascher, T., & Volet, S. E. (2015). Teacher emotions in the classroom: associations with students' engagement, classroom discipline and the interpersonal teacher-student relationship. *European journal of psychology of education*, *30*, 385-403.

Hai, W., Jain, N., Wydra, A., Thalmann, N. M., & Thalmann, D. (2018, May). Increasing the feeling of social presence by incorporating realistic interactions in multi-party vr. In *Proceedings of the 31st International Conference on Computer Animation and Social Agents* (pp. 7-10).

Haidet, K. K., Tate, J., Divirgilio-Thomas, D., Kolanowski, A., & Happ, M. B. (2009). Methods to improve reliability of video-recorded behavioral data. *Research in nursing & health, 32*(4), 465-474.

Hajjar, S. T. (2018). Statistical analysis: internal-consistency reliability and construct validity. *International Journal of Quantitative and Qualitative Research Methods*, *6*(1), 27-38.

Hamilton, D., McKechnie, J., Edgerton, E., & Wilson, C. (2020). Immersive virtual reality as a pedagogical tool in education: a systematic literature review of quantitative learning outcomes and experimental design. *Journal of Computers in Education, 8*(1), 1-32.

Hamlin, H. (2013). *The Bible in Shakespeare*. New York: NY: Oxford University Press.

Harms, C., & Biocca, F. (2004). Internal consistency and reliability of the networked minds social presence measure. In M. Alcaniz & B. Rey (Eds.), *Seventh Annual International Workshop: Presence 2004.* Valencia: Universidad Politecnica de Valencia.

Harris, H., Bailenson, J. N., Nielsen, A., & Yee, N. (2009). The evolution of social behavior over time in second life. *Presence: Teleoperators and Virtual Environments, 18*(6), 434-448.

Harvey, M., Deuel, A., & Marlatt, R. (2020). "To be, or not to be": Modernizing Shakespeare with multimodal learning stations. *Journal of Adolescent & Adult Literacy, 63*(5), 559-568.

Hassouneh, D., & Brengman, M. (2014). A motivation-based typology of social virtual world users. *Computers in Human Behavior, 33*, 330-338.

Hawrilenko, M., Kroshus, E., Tandon, P., & Christakis, D. (2021). The association between school closures and child mental health during COVID-19. *JAMA Network Open, 4*(9), 1-11.

Heilporn, G., & Lakhal, S. (2020). Investigating the reliability and validity of the community of inquiry framework: An analysis of categories within each presence. *Computers & Education, 145*, 1-20.

Herr, K., & Anderson, G. L. (2005). *The action research dissertation: A guide for students and faculty*. Thousand Oaks, California: Sage Publications.

Ho, D.G.E., Sa'adi, M., He, D. & Hoon, C. (2023). Silence over the wire: student verbal participation and the virtual classroom in the digital era. *Asia Pacific Education Review*, 1-17. https://doi.org/10.1007/s12564-023-09834-4

Ho, L. H., Sun, H., & Tsai, T. H. (2019). Research on 3D painting in virtual reality to improve students' motivation of 3D animation learning. *Sustainability, 11*(1605), 1-17.

Holly, M., Pirker, J., Resch, S., Brettschuh, S., & Gütl, C. (2021). Designing VR experiences–Expectations for teaching and learning in VR. *Educational Technology & Society, 24*(2), 107-119.

Honigmann, E. A. J. (1959). Shakespeare's Plutarch. *Shakespeare Quarterly*, *10*(1), 25-33.

Horzum, M. B. (2017). Interaction, structure, social presence, and satisfaction in online learning. *Eurasia Journal of Mathematics, Science and Technology Education*, *11*(3), 505-512.

Howard, J. L., Bureau, J., Guay, F., Chong, J. X., & Ryan, R. M. (2021). Student motivation and associated outcomes: A meta-analysis from self-determination theory. *Perspectives on Psychological Science*, *16*(6), 1300-1323.

Howley, A., Rhodes, M., & Beall, J. (2009). Challenges facing rural schools: Implications for gifted students. *Journal for the Education of the Gifted*, *32*(4), 515-536.

Hsu, Y. C. (2020). Exploring the learning motivation and effectiveness of applying virtual reality to high school mathematics. *Universal Journal of Educational Research*, *8*(2), 438-444.

Huang, K. T., Ball, C., Francis, J., Ratan, R., Boumis, J., & Fordham, J. (2019). Augmented versus virtual reality in education: an exploratory study examining science knowledge retention when using augmented reality/virtual reality mobile applications. *Cyberpsychology, Behavior, and Social Networking*, *22*(2), 105-110.

Huang, W., Roscoe, R. D., Johnson-Glenberg, M. C., & Craig, S. D. (2020). Motivation, engagement, and performance across multiple virtual reality sessions and levels of immersion. *Journal of Computer Assisted Learning*, *37*(3), 745-758.

Hutson, J. (2022). Social virtual reality: Neurodivergence and inclusivity in the metaverse. *Societies, 12*(4), 102.

Hughes, K. (2016). Record/film/book/interactive TV: EVR as a threshold format. *Television & New Media*, *17*(1), 44-61.

Ioannou, M., & Ioannou, A. (2020). Technology-enhanced embodied learning. *Educational Technology & Society, 23*(3), 81-94.

Janesick, V. J. (2007). Peer debriefing. *The Blackwell encyclopedia of sociology*.

Januszewski, A., & Molenda, M. (2008). *Educational technology: A definition with commentary*. New York, NY: Routledge.

Jarmon, L., Traphagan, T., Mayrath, M., & Trivedi, A. (2009). Virtual world teaching, experiential learning, and assessment: An interdisciplinary communication course in Second Life. *Computers & Education*, *53*(1), 169-182.

Jehma, H., & Akaraphattanawong, A. (2023). VRChat as a virtual learning platform for enhancing English listening skills. *International Journal of Information and Education Technology*, *13*(5), 813-817.

Jick, T. D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative Science Quarterly, 24*(4), 602-611.

Johnson, D. W. (1981). Student-student interaction: The neglected variable in education. *Educational researcher, 10*(1), 5-10.

Kardong-Edgren, S. S., Farra, S. L., Alinier, G., & Young, H. M. (2019). A call to unify definitions of virtual reality. *Clinical Simulation in Nursing*, *31*, 28-34.

Katz, J. E., & Halpern, D. (2015). Can virtual museums motivate students? Toward a constructivist learning approach. *Journal of Science Education and Technology*, *24*(6), 776-788.

Kavanagh, S., Luxton-Reilly, A., Wuensche, B., & Plimmer, B. (2017). A systematic review of virtual reality in education. *Themes in Science and Technology Education, 10*(2), 85-119.

Keil, M., & Johnson, R. D. (2002). Feedback channels: Using social presence theory to compare voice mail to e-mail. *Journal of Information Systems Education*, *13*(4), 295-302.

Keles, E. (2018). Use of Facebook for the community services practices course: Community of inquiry as a theoretical framework. *Computers & Education*, *116*, 203-224.

Kettler, T., Russell, J., & Puryear, J. S. (2015). Inequitable access to gifted education: Variance in funding and staffing based on locale and contextual school variables. *Journal for the Education of the Gifted*, *38*(2), 99-117.

Khodabandeh, F. (2022). Exploring the applicability of virtual reality-enhanced education on extrovert and introvert EFL learners' paragraph writing. *International Journal of Educational Technology in Higher Education*, *19*(1), 1-21.

Kimmons, R. (2022). Mixed methods: How does one go about doing good mixed methods research? In *Education Research*. EdTech Books.

Kingston, N., & Nash, B. (2011). Formative assessment: A meta-analysis and a call for research. *Educational measurement: Issues and practice, 30*(4), 28-37.

Kozan, K., & Richardson, J. C. (2014). New exploratory and confirmatory factor analysis insights into the community of inquiry survey. *The Internet and Higher Education*, *23*, 39-47.

Kožuh, I., Jeremić, Z., Sarjaš, A., Bele, J. L., Devedžić, V., & Debevc, M. (2015). Social presence and interaction in learning environments: The effect on student success. *Journal of Educational Technology & Society*, *18*(1), 223-236.

Kraj, V. J., Maranzatto, T., Geigel, J., Bailey, R., & Ovesdotter Alm, C. (2020). Evaluating audience engagement of an immersive performance on a virtual stage. *Frameless, 2*(1), 1-15.

Krassmann, A. L., Nunes, F. B., Bessa, M., Tarouco, L. M. R., & Bercht, M. (2019). Virtual companions and 3D virtual worlds: Investigating the sense of presence in distance education. In *International Conference on Human-Computer Interaction* (pp. 175-192). Switzerland: Springer Nature.

Kreijns, K., Bijker, M., & Weidlich, J. (2020). A Rasch analysis approach to the development and validation of a social presence measure. In *Rasch measurement* (pp. 197-221). Singapore: Springer.

Kreijns, K., Kirschner, P. A., Jochems, W., & Van Buuren, H. (2011). Measuring perceived social presence in distributed learning groups. *Education and Information Technologies, 16*(4), 365-381.

Kreijns, K., Van Acker, F., Vermeulen, M., & Van Buuren, H. (2014). Community of inquiry: Social presence revisited. *E-learning and Digital Media*, *11*(1), 5-18.

Kucharczyk, S., & Kucharczyk, M. (2022). *Teaching Shakespeare in primary schools: all the world's a stage*. New York, NY: Routledge.

Kuckartz, U., & Rädiker, S. (2019). Transcribing audio and video recordings. In *Analyzing qualitative data with MAXQDA* (pp. 41-49). Berlin, Germany: Springer.

Kunzman, R., & Gaither, M. (2020). Homeschooling: An updated comprehensive survey of the research. *Other Education-the journal of educational alternatives*, *9*(1), 253-336.

Lan, Y. J. (2015). Contextual EFL learning in a 3D virtual environment. *Language Learning & Technology*, *19*(2), 16-31.

Latvala, E., Vuokila-Oikkonen, P., & Janhonen, S. (2000). Videotaped recording as a method of participant observation in psychiatric nursing research. *Journal of advanced nursing*, *31*(5), 1252-1257.

Lederman, D. (2018). Online enrollments grow, but pace slows. *Inside Higher Ed.* Retrieved from https://www.insidehighered.com/digital-learning/article/2019/12/11/more-students-study-online-rate-growth-slowed-2018

Lee, A. (2019). Using virtual reality to test academic listening proficiency. *Korean Journal of English Language and Linguistics*, *19*(4), 688-712.

Lennox, G., & Mason, H. (2022). Virtual Dream Reality Check: A Case of Interactive Digital Theatre from the Royal Shakespeare Company. *Body, Space & Technology*, *21*(1).

Levy, F., Leboucher, P., Rautureau, G., & Jouvent, R. (2016). E-virtual reality exposure therapy in acrophobia: A pilot study. *Journal of Telemedicine and Telecare*, *22*(4), 215-220.

Liou, H. H., Yang, S. J., Chen, S. Y., & Tarng, W. (2017). The influences of the 2D image-based augmented reality and virtual reality on student learning. *Journal of Educational Technology & Society*, *20*(3), 110-121.

Liu, R., Wang, L., Koszalka, T. A., & Wan, K. (2022). Effects of immersive virtual reality classrooms on students' academic achievement, motivation and cognitive load in science lessons. *Journal of Computer Assisted Learning*, *38*(5), 1422-1433.

Liu, R., Wang, L., Lei, J., Wang, Q., & Ren, Y. (2020). Effects of an immersive virtual reality-based classroom on students' learning performance in science lessons. *British Journal of Educational Technology*, *51*(6), 2034-2049.

Lopreiato J O (Ed.), Downing D., Gammon W., Lioce L., Sittner B., Slot V., Spain A E and the Terminology & Concepts Working Group. (2016). *Healthcare simulation dictionary*. Rockville, MD: Agency for Healthcare Research and Quality.

Mackey, B. A., Bremner, P. A., & Giuliani, M. (2020, March). The effect of virtual reality control of a robotic surrogate on presence and social presence in comparison to telecommunications software. In *Companion of the 2020 ACM/IEEE International Conference on Human-Robot Interaction* (pp. 349-351). New York, NY: Association for Computer Machinery.

Mann, B., Kotok, S., Frankenberg, E., Fuller, E., & Schafft, K. (2016). Choice, cyber charter schools, and the educational marketplace for rural school districts. *The Rural Educator*, *37*(3), 17-29.

Martin, F., Ritzhaupt, A., Kumar, S., & Budhrani, K. (2019). Award-winning faculty online teaching practices: Course design, assessment and evaluation, and facilitation. *The Internet and Higher Education*, *42*, 34-43.

Martin, F., Wu, T., Wan, L., & Xie, K. (2022). A meta-analysis on the community of inquiry presences and learning outcomes in online and blended learning Environments. *Online Learning*, *26*(1), 325-359.

Maxwell, J. A. (2016). Expanding the history and range of mixed methods research. *Journal of Mixed Methods Research*, *10*(1), 12-27.

Mayne, R., & Green, H. (2020). Virtual reality for teaching and learning in crime scene investigation. Science & Justice, 60(5), 466-472.

McInnis (2021). What can Shakespeare do for virtual reality? In S. Wittek & D. McInnis, (Eds.), *Shakespeare and virtual reality (elements in Shakespeare and pedagogy)*. Cambridge: Cambridge University Press.

McClannon, T. W., Cheney, A. W., Bolt, L. L., & Terry, K. P. (2018). Predicting sense of presence and sense of community in immersive online learning environments. *Online Learning*, *22*(4), 141-159.

McClellan, J.E., & Dorn, H. (2015). *Science and technology in world history: An introduction.* Baltimore, Md: John Hopkins University Press.

McCusker, K., & Gunaydin, S. (2015). Research using qualitative, quantitative or mixed methods and choice based on the research. *Perfusion*, *30*(7), 537-542.

McKerlich, R., & Anderson, T. (2007). Community of inquiry and learning in immersive environments. Journal of Asynchronous Learning Networks, 11(4), 35-52.

McKerlich, R., Riis, M., Anderson, T., & Eastman, B. (2011). Student perceptions of teaching presence, social presence, and cognitive presence in a virtual world, *Journal of Online Learning and Teaching, 7*(3), 324-336.

McMillan, J. H., & Schumacher, S. (2006). *Research in education: Evidence-based inquiry* (6th ed.). Boston, MA: Pearson/Allyn and Bacon.

McVeigh-Schultz, J., Kolesnichenko, A., & Isbister, K. (2019). Shaping pro-social interaction in VR: An emerging design framework. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (pp. 1-12). New York, NY: Association for Computing Machinery.

Merchant, Z., Goetz, E. T., Cifuentes, L., Keeney-Kennicutt, W., & Davis, T. J. (2014). Effectiveness of virtual reality-based instruction on students' learning outcomes in K-12 and higher education: A meta-analysis. *Computers & Education, 70*, 29-40.

Mertens, D. M. (2020). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods*. Thousand Oaks: California, Sage Publications.

Mertler, C. (2016). *Classroom assessment: A practical guide for educators* (7th ed). New York, NY: Routledge.

Miles, M.B., Huberman, A.M., & Saldaña, J. (2014) Qualitative data analysis: A methods sourcebook (3rd ed.). Thousand Oaks, CA: Sage.

Mouatt, B., Smith, A. E., Mellow, M. L., Parfitt, G., Smith, R. T., & Stanton, T. R. (2020). The use of virtual reality to influence motivation, affect, enjoyment, and

engagement during exercise: A scoping review. *Frontiers in Virtual Reality*, 1, 564664.

Myshakespeare.com (n.d.) Retrieved from https://myshakespeare.com/

Mystakidis, S., Berki, E., & Valtanen, J. P. (2021). Deep and meaningful e-learning with social virtual reality environments in higher education: A systematic literature review. *Applied Sciences*, *11*(5), 1-25.

Naik, V., & Govindu, A. (2022). Enriching and Energizing the Virtual Classroom using Breakout Sessions: A Better Experience of Active Learning during COVID-19 Pandemic. *J. Eng. Educ. Transform*, *35*, 129-134.

Naito, R., McKee, M., Leong, D., Bangdiwala, S., Rangarajan, S., Islam, S., & Yusuf, S. (2023). Social isolation as a risk factor for all-cause mortality: Systematic review and meta-analysis of cohort studies. *Plos One*, *18*(1), 1-16.

National Center for Education Statistics. (n.d.). *Average class size in public schools, by class type and state: 2017–18.* Retrieved from https://nces.ed.gov/surveys/ntps/tables/ntps1718_fltable06_t1s.asp

National Center for Education Statistics. (2022). Public charter school enrollment. Condition of Education. U.S. Department of Education, Institute of Education Sciences. https://nces.ed.gov/programs/coe/indicator/cgb.

Nola, R. (1997). Constructivism in science and science education: A philosophical critique. *Science & Education*, *6*(1), 55-83.

Novitz, J. (2020) 'The time is out of joint': Interactivity and player agency in videogame adaptations of Hamlet. *Multidisciplinary Digital Publishing Institute*, *9*(4), 1-17.

Nowak, K. L., & Biocca, F. (2003). The effect of the agency and anthropomorphism on users' sense of telepresence, copresence, and social presence in virtual environments. *Presence: Teleoperators & Virtual Environments*, *12*(5), 481-494.

Oh, C. S., Bailenson, J. N., & Welch, G. F. (2018). A systematic review of social presence: Definition, antecedents, and implications. *Frontiers in Robotics and AI, 5*, 1-3.

OCSD Schools (n.d.). https://www.ocsdsc.org/domain/77

Obilor, E. I. (2023). Convenience and purposive sampling techniques: Are they the same. *International Journal of Innovative Social & Science Education Research, 11*(1), 1-7.

Organisation for Economic Co-operation and Development. (2015). *Data-driven innovation: Big data for growth and well-being*. Paris, France: OECD Publishing.

Oultram, S. (2013). Virtual plagues and real-world pandemics: Reflecting on the potential for online computer role-playing games to inform real world epidemic research. *Medical Humanities*, *39*(2), 115-118.

Over, H., & Carpenter, M. (2013). The social side of imitation. *Child development perspectives*, *7*(1), 6-11.

Owens, K. (2020). *Going digital with peer review* (Unpublished doctoral dissertation). University of South Carolina, Columbia, South Carolina.

Page, R. L. (2000). Brief history of flight simulation. In *SimTecT 2000 Proceedings* (pp. 11-17). Australia: SimTechT 2000 Organising and Technical Committee.

Palincsar, A. S. (1998). Social constructivist perspectives on teaching and learning. *Annual Review of Psychology*, *49*(1), 345-375.

Parmaxi, A. (2020). Virtual reality in language learning: A systematic review and implications for research and practice. *Interactive Learning Environments*, 1-13.

Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health Services Research*, *34*(5 Pt 2), 1189-1208.

Paul, I., Mohanty, S., & Sengupta, R. (2022). The role of social virtual world in increasing psychological resilience during the on-going COVID-19 pandemic. *Computers in Human Behavior*, *127*, 1-10.

Pavic, K., Vergilino-Perez, D., Gricourt, T., & Chaby, L. (2022). Because I'm happy—an overview on fostering positive emotions through virtual reality. *Frontiers in Virtual Reality*, 3, 788820.

Pellas, N. (2017). An exploration of interrelationships among presence indicators of a community of inquiry in a 3D game-like environment for high school programming courses. *Interactive Learning Environments*, *25*(3), 343-360.

Peterson, A. T., Beymer, P. N., & Putnam, R. T. (2018). Synchronous and asynchronous discussions: Effects on cooperation, belonging, and affect. *Online Learning*, *22*(4), 7-25.

Piacentini, M., & Mailer, G. (2004). Symbolic consumption in teenagers' clothing choices. *Journal of Consumer Behaviour: An International Research Review*, *3*(3), 251-262.

Pirker, J., & Dengel, A. (2021). The potential of 360 virtual reality videos and real VR for education—a literature review. *IEEE computer graphics and applications*, *41*(4), 76-89.

Pilotti, M., Anderson, S., Hardy, P., Murphy, P., & Vincent, P. (2017). Factors related to cognitive, emotional, and behavioral engagement in the online asynchronous classroom. *International Journal of Teaching and Learning in Higher Education, 29*(1), 145-153.

Poor, J., & Vasconcelos, L. (2023). Impact of Virtual Field Trips on Elementary Students' Interest in Science and STEM. In *Technology Integration and Transformation in STEM Classrooms* (pp. 198-222). IGI Global.

Popescu, E., & Badea, G. (2020). Exploring a community of inquiry supported by a social media-based learning environment. *Educational Technology & Society, 23*(2), 61-76.

Poquet, O., Kovanović, V., de Vries, P., Hennis, T., Joksimović, S., Gašević, D., & Dawson, S. (2018). Social presence in massive open online courses. *International Review of Research in Open and Distributed Learning, 19*(3), 43-68.

Priyadarshini, A., & Bhaumik, R. (2020). E-readiness of senior school learners to online learning transition amid COVID-19 lockdown. *Asian Journal of Distance Education, 15*(1), 244-256.

Psotka, J. (2013). Educational games and virtual reality as disruptive technologies. *Journal of Educational Technology & Society, 16*(2), 69-80.

Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers & Education, 147*, 1-29.

Rahman, M. H. A., Phon, D. N. E., Utama, N. I., Yahaya, N., Halim, N. D. A., & Kasim, S. (2019). Sense of presence and learning satisfaction among students of different age groups in a 3-D virtual world. *International Journal on Advanced Science, Engineering and Information Technology*, *9*(2), 711-716.

Ramnanan, A. (2013). *Introducing Shakespeare early: Why, when, and how to teach Shakespeare to elementary and middle school students* (Unpublished Master's Thesis). Georgetown University, Washington, D.C.

Rasheed, M. (2020). Context and content in rural gifted education: A literature review. *Journal of Advanced Academics*, *31*(1), 61-84.

Razali, N. M., & Wah, Y. B. (2011). Power comparisons of shapiro-wilk, kolmogorov-smirnov, lilliefors and anderson-darling tests. *Journal of statistical modeling and analytics*, *2*(1), 21-33.

Regnault, A., Willgoss, T., & Barbic, S. (2018). Towards the use of mixed methods inquiry as best practice in health outcomes research. *Journal of Patient-Reported Outcomes*, *2*(1), 1-4.

Reidy, J. (2021). Reviewing school uniform through a public health lens: Evidence about the impacts of school uniform on education and health. *Public Health Reviews*, *42*, 1604212.

Richardson, J. C., Maeda, Y., Lv, J., & Caskurlu, S. (2017). Social presence in relation to students' satisfaction and learning in the online environment: A meta-analysis. *Computers in Human Behavior*, *71*, 402-417.

Riel, V., Parcel, T. L., Mickelson, R. A., & Smith, S. S. (2018). Do magnet and charter schools exacerbate or ameliorate inequality? *Sociology Compass*, 12(9), e12617.

Roberts-Smith, J. (2021). What can Shakespeare do for virtual reality? In S. Wittek & D. McInnis (Eds.), *Shakespeare and virtual reality (elements in Shakespeare and pedagogy)*. Cambridge: Cambridge University Press.

Robinson, R., Molenda, M., & Rezabek, L. (2008). Facilitating learning. In A. Januszewski & M. Molenda (Eds.), *Educational technology: A definition with commentary*. New York, NY: Routledge.

Rockinson-Szapkiw, A. J., Wendt, J., Whighting, M., & Nisbet, D. (2016). The predictive relationship among the community of inquiry framework, perceived learning and online, and graduate students' course grades in online synchronous and asynchronous courses. *International Review of Research in Open and Distributed Learning*, *17*(3), 18-35.

Rose, E. (2017). Beyond social presence: Facelessness and the ethics of asynchronous online education. *McGill Journal of Education/Revue des sciences de l'éducation de McGill*, *52*(1), 17-32.

Rourke, L. Anderson, T., Garrison, D. R., & Archer, W. (2001). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education, 14*(2), 51-70.

Rus-Calafell, M., Gutiérrez-Maldonado, J., Botella, C., & Baños, R. M. (2013). Virtual reality exposure and imaginal exposure in the treatment of fear of flying: A pilot study. *Behavior Modification, 37*(4), 568-590.

Saldaña, J., & Omasta, M. (2016). *Qualitative research: Analyzing life*. Los Angeles, CA: Sage Publications.

Saldaña, J. (2016). *The Coding Manual for Qualitative Researchers* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Saldaña, J. (2021). *The Coding Manual for Qualitative Researchers* (4th ed.). Thousand Oaks, CA: Sage Publications.

Sample, A. (2020). Using augmented and virtual reality in information literacy instruction to reduce library anxiety in nontraditional and international students. *Information Technology and Libraries*, *39*(1), 1-33. https://doi.org/10.6017/ital.v39i1.11723

Santos, J. R. A. (1999). Cronbach's alpha: A tool for assessing the reliability of scales. *Journal of extension*, *37*(2), 1-5.

Saredakis, D., Szpak, A., Birckhead, B., Keage, H. A., Rizzo, A., & Loetscher, T. (2020). Factors associated with virtual reality sickness in head-mounted displays: a systematic review and meta-analysis. *Frontiers in Human Neuroscience*, *14*, 1-11.

Sarwar, A., Islam, M., Mohiuddin, M., Tareq, M. A., & Siddika, A. (2022). Social connections and self-perceived depression: An enhanced model for studying teenagers' mental wellbeing. *International Journal of Environmental Research and Public Health*, *19*(23), 15791.

Sattar, M. U., Palaniappan, S., Lokman, A., Hassan, A., Shah, N., & Riaz, Z. (2019). Effects of virtual reality training on medical students' learning motivation and competency. *Pakistan Journal of Medical Sciences*, *35*(3), 852-857.

Saunders, B., Kitzinger, J., & Kitzinger, C. (2015). Anonymizing interview data: Challenges and compromise in practice. *Qualitative Research*, *15*(5), 616- 632.

Scheff, T. J. (1986). Toward resolving the controversy over "Thick Description". *Current Anthropology, 27*(4), 408-409.

Schools. (2022). https://sccharter.org/schools/

Schoonenboom, J., & Johnson, R. B. (2017). How to construct a mixed methods research design. *Cologne Journal for Sociology and Social Psychology, 69*(2), 107-131.

Schroeder, R. (1996). *Possible worlds: The social dynamic of virtual reality technology*. Boulder, CO: Westview Press, Inc.

Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). *Biometrika, 52*(3/4), 591-611.

Sharfstein, J. M., & Morphew, C. C. (2020). The urgency and challenge of opening K-12 Schools in the fall of 2020. *JAMA, 324*(2), 133-134.

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*(2), 63-75.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. New York, NY: Wiley.

Sieber, S. D. (1973). The integration of fieldwork and survey methods. *American Journal of Sociology, 78*(6), 1335-1359.

Simonson, M., Schlosser, C., & Orellana, A. (2011). Distance education research: A review of the literature. *Journal of Computing in Higher Education, 23*(2), 124-142.

Slezak, P. (1994) Varieties of constructivism and their (ir-) relevance to science education. In M. Matthews (Ed.) *Science teaching: The role of history and philosophy on science* (pp. 21-39). New York: NY: Routledge.

Smith, M., & Berge, Z. L. (2009). Social learning theory in Second Life. *MERLOT Journal of Online Learning and Teaching, 5*(2), 439-445.

Sikkink, D., & Skiles, S. (2015). Homeschooling and young adult outcomes: Evidence from the 2011 and 2014 Cardus Education Survey. *The Cardus Religious Schools Initiative*. University of Notre Dame, IN.

So, H. J., Lossman, H., Lim, W. Y., & Jacobson, M. J. (2009). Designing an online video based platform for teacher learning in Singapore. *Australasian Journal of Educational Technology, 25*(3), 443-457.

Soto, N. C., Navas-Parejo, M. R., & Guerrero, A. J. M. (2020). Virtual reality and motivation in the educational context: Bibliometric study of the last twenty years from Scopus. *Alteridad, 15*(1), 44-56.

Stambaugh, T. (2015). *Serving gifted students in rural settings*. Waco, Texas: Prufrock Press.Standards. Washington, D.C.: Council of Chief State School Officers.

Stenbom, S. (2018). A systematic review of the Community of Inquiry survey. *The Internet and Higher Education, 39*, 22-32.

Stepan, K., Zeiger, J., Hanchuk, S., Del Signore, A., Shrivastava, R., Govindaraj, S., & Iloreta, A. (2017). Immersive virtual reality as a teaching tool for neuroanatomy. *International Forum of Allergy & Rhinology, 7*(10), 1006-1013.

Steuer, J. (1992). Defining virtual reality: Dimensions determining telepresence. *Journal of Communication, 42*(4), 73-93.

Strand, S. (2009). Attitude to Shakespeare among Y10 students: Final report to the Royal Shakespeare Company on the Learning and Performance Network student survey 2007–2009. *CEDAR, University of Warwick*.

Strauss, A., & Corbin, J. (1998). Basics of qualitative research techniques (2nd ed.). Newbury Park, CA: Sage.

Sun, A., & Chen, X. (2016). Online education and its effective practice: A research review. *Journal of Information Technology Education: Research, 15*, 157-190.

Susak, M. (2016). Factors that affect classroom participation.

Swan, K., Garrison, D. R., & Richardson, J. C. (2009). A constructivist approach to online learning: The community of inquiry framework. In *Information technology and constructivism in higher education: Progressive learning frameworks* (pp. 43-57). Hershey, PA: IGI global.

Sriworapong, S., Pyae, A., Thirasawasd, A., & Keereewan, W. (2022, August). Investigating students' engagement, enjoyment, and sociability in virtual reality-based systems: A comparative usability study of spatial. io, Gather. town, and Zoom. In *International Conference on Well-Being in the Information Society* (pp. 140-157). Cham: Springer International Publishing.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International journal of medical education, 2*, 53-55.

Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American journal of evaluation, 27*(2), 237-246.

Thompson, A., & Turchi, L. (2016). *Teaching Shakespeare with purpose: A student-centred approach*. London, England: Bloomsbury Publishing.

Thompson, C. (2022). As U.S. Schools reopen, many families continue to opt for homeschooling. Retrieved from: https://www.pbs.org/newshour/education/as-u-s-schools-reopen-many-families-continue-to-opt-for-homeschooling

Tiwari, A., & Damle, M. (2020). Exploration of innovation attributes on intention and adoption of virtual reality (VR) in entertainment. *PalArch's Journal of Archaeology of Egypt/Egyptology*, *17*(6), 4815-4835.

Tong, T., Smith, S. L., Fienberg, M., & Kho, A. (2023). Charter schools: An alternative option in American schooling. *Encyclopedia*, *3*(1), 362-370.

Toste, J. R., Didion, L., Peng, P., Filderman, M. J., & McClelland, A. M. (2020). A meta-analytic review of the relations between motivation and reading achievement for K–12 students. *Review of Educational Research*, *90*(3), 420-456.

Ullyot (2021). What can Shakespeare do for virtual reality? In S. Wittek & D. McInnis, (Eds.), *Shakespeare and virtual reality (elements in Shakespeare and pedagogy)*. Cambridge: Cambridge University Press.

United States Census Bureau. (n.d.). QuickFacts: Orangeburg County, South Carolina Retrieved from https://www.census.gov/quickfacts/orangeburgcountysouthcarolina

United States Department of Agriculture Economic Research Service. (2019). Retrieved from https://www.ers.usda.gov/data-products/county-typology codes/descriptions-and-maps/

U.S. News. (2023). https://www.usnews.com/news/best-states/south-carolina

van den Berg, M., Hartmann, T., & de Graaf, R. (2017). Supporting design reviews with pre-meeting virtual reality environments. *Journal of Information Technology in Construction (ITcon), 22*(16), 305-321.

Vandenberg, S., & Magnuson, M. (2021). A comparison of student and faculty attitudes on the use of Zoom, a video conferencing platform: A mixed-methods study. *Nurse Education in Practice*, *54*, 103138.

Villena-Taranilla, R., Tirado-Olivares, S., Cózar-Gutiérrez, R., & González-Calero, J. A. (2022). Effects of virtual reality on learning outcomes in K-6 education: A meta-analysis. *Educational Research Review*, *35*, 1-13. doi: doi.org/10.1016/j.edurev.2022.100434

Vindenes, J., & Wasson, B. (2021, June). Show, don't tell: Using go-along interviews in immersive virtual reality. In *Designing interactive systems conference 2021* (pp. 190-204). New York, NY: Association for Computer Machinery.

Vrchat. (n.d.). Retrieved from https://hello.vrchat.com/

VRChat Inc. (2023). *Press Kit.* Hello.vrchat.com

Wang, K., Rathburn, A., & Musu, L. (2019). School choice in the United States: 2019. NCES 2019-106. *National Center for Education Statistics*. Washington, D.C.

Waters, L. H., Barbour, M. K., & Menchaca, M. P. (2014). The nature of online charter schools: Evolution and emerging concerns. *Journal of Educational Technology & Society*, *17*(4), 379-389.

Won, A. S., Bailey, J. O., & Yi, S. (2020, June). Work-in-progress—learning about virtual worlds in virtual worlds: How remote learning in a pandemic can inform future teaching. In *2020 6th International Conference of the Immersive Learning Research Network (iLRN)* (pp. 377-380). IEEE.

Wu, W. C. V., Hsieh, J. S. C., & Yang, J. C. (2017). Creating an online learning community in a flipped classroom to enhance EFL learners' oral proficiency. *Journal of Educational Technology & Society*, *20*(2), 142-157.

Wu, Y. J. A., Lan, Y. J., Huang, S. B. P., & Lin, Y. T. R. (2019). Enhancing medical students' communicative skills in a 3D virtual world. *Journal of Educational Technology & Society*, *22*(4), 18-32.

Yang, G., Chen, Y. T., Zheng, X. L., & Hwang, G. J. (2021). From experiencing to expressing: A virtual reality approach to facilitating pupils' descriptive paper writing performance and learning behavior engagement. *British Journal of Educational Technology*, *52*(2), 807-823.

Yarramreddy, A., Gromkowski, P., & Baggili, I. (2018). Forensic analysis of immersive virtual reality social applications: a primary account. In *2018 IEEE Security and Privacy Workshops (SPW)*, SanFrancisco, CA, pp. 186-196.

Yildirim, G., Elban, M., & Yildirim, S. (2018). Analysis of use of virtual reality technologies in history education: A case study. *Asian Journal of Education and Training*, *4*(2), 62-69.

Yu, Z., & Xu, W. (2022). A meta-analysis and systematic review of the effect of virtual reality technology on users' learning outcomes. *Computer Applications in Engineering Education*, *30*(5), 1470-1484.

York, T. T., Gibson, C., & Rankin, S. (2015). Defining and measuring academic success. *Practical Assessment, Research, and Evaluation*, *20*(1), 1-20.

Zhan, T., Yin, K., Xiong, J., He, Z., & Wu, S. T. (2020). Augmented reality and virtual reality displays: Perspectives and challenges. *Iscience*, *23*(8), 1-13.

Zibrek, K., & McDonnell, R. (2019, October). Social presence and place illusion are affected by photorealism in embodied VR. In *Proceedings of the 12th ACM SIGGRAPH Conference on Motion, Interaction and Games* (pp. 1-7).

Zhou, J., & Guo, W. (2016). Imitation in Undergraduate Teaching and Learning. *Journal of Effective Teaching*, *16*(3), 5-27.

Zhou, Z., Jin, X. L., Vogel, D. R., Fang, Y., & Chen, X. (2011). Individual motivations and demographic differences in social virtual world users: An exploratory investigation in Second Life. *International Journal of Information Management*, *31*(3), 261-271.

APPENDIX A

CONSENT AND ASSENT FORMS

UNIVERSITY OF SOUTH CAROLINA

CONSENT TO BE A RESEARCH SUBJECT

Shakespeare in Virtual Reality:
Social Presence of Rural Students in a Virtual Reality Book Club

KEY INFORMATION ABOUT THIS RESEARCH STUDY:
You are invited to take part in a research study being done by John Ott, Jr. I am a doctoral candidate in the Department of Education, at the University of South Carolina. The University of South Carolina, Department of Education, is sponsoring this research study. The purpose of this study is to examine social presence and knowledge of Shakespearean works after participating in virtual reality sessions. You are being asked to take part in this study because you are in 8th to 12th grade and based in the United States. Students who participate should have access to an internet connection as well as be able to participate in the online sessions. This study is being done remotely and will have up to fifteen participants.

Below is a short summary of this study to help you decide if you want to be in this study. More details about this study are listed later in this form.

This study will take place over eight weeks. You will use videoconferencing to meet up with other students and the researcher. Next, students will participate in virtual world activities that include William Shakespeare. If you feel any nausea, feel free to turn off the virtual reality headset. You will learn more about Shakespeare and practice using virtual reality technology.

Students will meet up on a videoconferencing website one day a week for eight weeks. Each week the students will use virtual reality headsets and visit virtual worlds. In these virtual worlds, students will learn about the works of William Shakespeare. Some students experience cybersickness within virtual reality (Maritrosov, S., Bureš, M., & Zítka, 2022). Students can take off the headset at any time they wish. The student will learn about the works of William Shakespeare while also meeting with one another in virtual reality.

PROCEDURES

If you agree to be in this study, you will:

1. Complete an assessment on Shakespeare knowledge
2. Complete eight weeks of virtual reality book club meetings. The researcher will be taking videos of the virtual reality book club sessions. Students will be asked to complete writing prompts and answer Shakespeare knowledge questions after sessions.
3. Complete three surveys focused on social presence
4. Participate in videoconferencing interviews. Interviews will be recorded.

DURATION:
Being in the study involves eight online sessions over eight weeks. Each study visit will last about 2 hours.

RISKS/DISCOMFORTS:

Online Sessions:
Others in the group will hear what you say and could tell others. Other students could also capture video and audio during sessions without permission from the researcher. The study team cannot promise what you say will be kept private, but they will ask that you, and all other group members, keep what is shared private.

Loss of Confidentiality:
There is the risk that what you share or your name will not remain private. The study team will take many steps to keep what you share and your name private. Details about those steps are given later in this consent form.

BENEFITS:

You may benefit from taking part in this study by learning about the works of William Shakespeare and socializing with other students in a virtual reality setting.

COSTS:
There will be no costs to you for being in this study.

PAYMENT TO PARTICIPANTS:

You will not be paid for being in this study.

CONFIDENTIALITY OF RECORDS:

Information obtained about you during this research may be published, but you will not be identified in these potential research publications. Information that is obtained concerning this research that can be identified with you will remain confidential within State and Federal law. All records in South Carolina are subject to subpoena by a court of law. The investigators associated with this study, the sponsor, and the Institutional Review Board will

have access to identifying information. During the duration of this study, password-protected websites will be used to store some study information and password-protected devices will also be used to store some study information.

VOLUNTARY PARTICIPATION:
Taking part in this research study is voluntary. You are free not to take part, or to stop taking part at any time. If you withdraw from this study, the information you already have given to the study team will be kept private. If you wish to withdraw from the study, please call or email the main researcher who is listed on this form.

Concerns about your rights as a research subject are to be directed to, Lisa Johnson, Associate Director, Office of Research Compliance, University of South Carolina, 1600 Hampton Street, Suite 414D, Columbia, SC 29208, phone: (803) 777-6670 or email: LisaJ@mailbox.sc.edu.

I have been given a chance to ask questions about this research study and my questions have been answered. **If I have any more questions about my taking part in this study, or a study related injury, I am to contact John Ott, Jr. at [redacted] or [redacted]**

I agree to take part in this study. I have been given a copy of this form for my own records.

If you wish to be in the study, you should sign below.

Signature of Subject / Participant	Date
Signature of Qualified Person Obtaining Consent	Date

UNIVERSITY OF SOUTH CAROLINA

ASSENT TO BE A RESEARCH SUBJECT

SHAKESPEARE IN VIRTUAL REALITY:
SOCIAL PRESENCE OF RURAL STUDENTS IN A VIRTUAL REALITY BOOK CLUB

If participants include those under 18 years of age: 1) The subject's parent or legal guardian will be present when the informed consent form is provided. 2) The subject will be able to participate only if the parent or legal guardian provides permission and the adolescent (age 13-17) provides his/her assent. 3) In statements below, the word "you" refers to your child or adolescent who is being asked to participate in the study.

I am a researcher from the University of South Carolina. I am working on a study about virtual reality and I would like your help. I am interested in learning more about the experiences of students during a virtual reality intervention focused on the works of William Shakespeare. Your parent/guardian has already said it is okay for you to be in the study, but it is up to you if you want to be in the study.

If you want to be in the study, you will be asked to do the following:

- Answer written questions relating to social presence and the works of Shakespeare. You will answer some questions on Shakespeare before the first intervention but you will be asked other questions throughout the study. These questions will be provided during the two hour sessions and will take no more than twenty minutes.

- Meet with me individually through videoconferencing and talk about social experiences in virtual reality and the works of William Shakespeare. The talk may take about thirty minutes.

Any information you share with me will be private. No one except me will know what your answers to the questions were without your permission. The audio and video files recorded by this researcher will not be shown in a public setting without permission from you.

You do not have to help with this study. Being in the study is not related to your regular class work and will not help or hurt your grades You can also drop out of the study at any time, for any reason, and you will not be in any trouble and no one will be mad at you.

Please ask any questions you would like to about the study.

*For Minors 13-17 years of age:
My participation has been explained to me, and all my questions have been answered. I am willing to participate.

Print Name of Minor	Age of Minor
Signature of Minor	Date

APPENDIX B

VIRTUAL WORLD MONOLOGUES

The Tragedy of Julius Caesar
Act 1, Scene 2

CASSIUS.
Why, man, he doth bestride the narrow world
Like a Colossus, and we petty men
Walk under his huge legs, and peep about
To find ourselves dishonourable graves.
Men at some time are masters of their fates:
The fault, dear Brutus, is not in our stars,
But in ourselves, that we are underlings.
“Brutus” and “Caesar”: what should be in that “Caesar”?
Why should that name be sounded more than yours?
Write them together, yours is as fair a name;
Sound them, it doth become the mouth as well;
Weigh them, it is as heavy; conjure with ’em,
“Brutus” will start a spirit as soon as “Caesar.”
Now in the names of all the gods at once,
Upon what meat doth this our Caesar feed,
That he is grown so great? Age, thou art sham’d!
Rome, thou hast lost the breed of noble bloods!
When went there by an age since the great flood,
But it was fam’d with more than with one man?
When could they say, till now, that talk’d of Rome,
That her wide walls encompass’d but one man?
Now is it Rome indeed, and room enough,
When there is in it but one only man.
O, you and I have heard our fathers say,
There was a Brutus once that would have brook’d
Th’ eternal devil to keep his state in Rome,
As easily as a king!

Macbeth
Act 5, Scene 5

MACBETH.
She should have died hereafter.

There would have been a time for such a word.
Tomorrow, and tomorrow, and tomorrow,
Creeps in this petty pace from day to day,
To the last syllable of recorded time;
And all our yesterdays have lighted fools
The way to dusty death. Out, out, brief candle!
Life's but a walking shadow; a poor player,
That struts and frets his hour upon the stage,
And then is heard no more: it is a tale
Told by an idiot, full of sound and fury,
Signifying nothing.

Hamlet
Act 5, scene 1

HAMLET.
To be, or not to be, that is the question:
Whether 'tis nobler in the mind to suffer
The slings and arrows of outrageous fortune,
Or to take arms against a sea of troubles,
And by opposing end them? To die—to sleep,
No more; and by a sleep to say we end
The heart-ache, and the thousand natural shocks
That flesh is heir to: 'tis a consummation
Devoutly to be wish'd. To die, to sleep.
To sleep, perchance to dream—ay, there's the rub,
For in that sleep of death what dreams may come,
When we have shuffled off this mortal coil,
Must give us pause. There's the respect
That makes calamity of so long life.
For who would bear the whips and scorns of time,
The oppressor's wrong, the proud man's contumely,
The pangs of dispriz'd love, the law's delay,
The insolence of office, and the spurns
That patient merit of the unworthy takes,
When he himself might his quietus make
With a bare bodkin? Who would these fardels bear,
To grunt and sweat under a weary life,
But that the dread of something after death,
The undiscover'd country, from whose bourn
No traveller returns, puzzles the will,
And makes us rather bear those ills we have
Than fly to others that we know not of?
Thus conscience does make cowards of us all,
And thus the native hue of resolution
Is sicklied o'er with the pale cast of thought,

And enterprises of great pith and moment,
With this regard their currents turn awry
And lose the name of action. Soft you now,
The fair Ophelia! Nymph, in thy orisons
Be all my sins remember'd.

Source:

The Project Gutenberg eBook of The Complete Works of William Shakespeare, by William Shakespeare (2022). Retrieved from https://www.gutenberg.org/files/100/100-h/100-h.htm#link2HCH0030

APPENDIX C

SHAKESPEARE KNOWLEDGE ASSESSMENT

The following passages are from works of William Shakespeare. Below each passage is a multiple-choice question about the text.

1. This is an excerpt from *The Tragedy of Julius Caesar.*

"Well, Brutus, thou art noble, yet I see
Thy honorable metal may be wrought
From that it is disposed. Therefore it is meet
That noble minds keep ever with their likes;
For who so firm that cannot be seduced?
Caesar doth bear me hard, but he loves Brutus.
If I were Brutus now, and he were Cassius,
He should not humor me. I will this night,
In several hands, in at his windows throw,
As if they came from several citizens,
Writings, all tending to the great opinion
That Rome holds of his name, wherein obscurely
Caesar's ambition shall be glancèd at.
And after this let Caesar seat him sure,
For we will shake him, or worse days endure."

What plan does Cassius outline in this final soliloquy?

A. Cassius will threaten Brutus' life if he doesn't comply with Cassius' plan.
B. Cassius will turn Brutus from good to evil by reminding him of "Caesar's ambition."
C. Cassius will plant fake letters from Romans praising Brutus and hinting that they want him to act against Caesar.
D. Cassius will plant in Brutus' mind his plot to assassinate him and make him believe it was his own.

2. This excerpt is from the play *Hamlet* by William Shakespeare.

"Let me see. Alas, poor Yorick! I knew him, Horatio,
a fellow of infinite jest, of most excellent fancy. He
hath bore me on his back a thousand times; and now
how abhorred in my imagination it is! My gorge rises
at it. Here hung those lips that I have kissed I know not
how oft. Where be your gibes now? Your gambols?
Your songs? Your flashes of merriment that were wont
to set the table on a roar? No one now to mock your

own grinning? Quite chop-fall'n? Now get you to my lady's chamber and tell her — let her paint an inch thick, to this favor she must come. Make her laugh at that. Prithee, Horatio, tell me one thing."

Who was Yorick?
A. The court jester
B. Hamlet's uncle
C. Hamlet's horse
D. A former nobleman

3. This is an excerpt from *The Tragedy of Julius Caesar*.
"Romans, countrymen, and lovers, hear me for my cause, and be silent, that you may hear. Believe me for mine honor, and have respect to mine honor, that you may believe. Censure me in your wisdom, and awake your senses, that you may the better judge. If there be any in this assembly, any dear friend of Caesar's, to him I say that Brutus' love to Caesar was no less than his. If then that friend demand why Brutus rose against Caesar, this is my answer: not that I loved Caesar less, but that I loved Rome more. Had you rather Caesar were living, and die all slaves, than that Caesar were dead, to live all free men? As Caesar loved me, I weep for him; as he was fortunate, I rejoice at it; as he was valiant, I honor him; but as he was ambitious, I slew him. There is tears for his love; joy for his fortune; honor for his valor; and death for his ambition. Who is here so base that would be a bondman? If any, speak, for him have I offended. Who is here so rude that would not be a Roman? If any, speak, for him have I offended. Who is here so vile that will not love his country? If any, speak, for him have I offended. I pause for a reply."

Which of the following emotions is Brutus NOT appealing to in this speech?
A. Patriotism
B. Fear of Slavery
C. Pride
D. Bravery

4. This is an excerpt from *The Tragedy of Julius Caesar*.
"Friends, Romans, countrymen, lend me your ears.
I come to bury Caesar, not to praise him.
The evil that men do lives after them;
The good is oft interrèd with their bones —

So let it be with Caesar."

How does Mark Antony begin his speech?

A. He explains that he will criticize Caesar even though this is his eulogy

B. He emphasizes that his purpose is simply to provide Caesar with a proper funeral, not to highlight the good in him.

C. He suggests that the conspirators are evil men who took unnecessary action.

D. He announces his intention to describe how wonderful Caesar was.

5. This is an excerpt from *Macbeth*.

"Of all men else I have avoided thee.
But get thee back; my soul is too much charged
With blood of thine already."

Why has Macbeth thus far avoided Macduff in battle?

A. He knows Macduff is a talented tiger.
B. He knows Macduff poses more of a threat than other men because of the witches' prophecies.
C. He feels guilty for having Macduff's family killed.
D. He would rather kill himself than die at Macduff's hands.

6. This is an excerpt from *Hamlet.*

"It's given out that, sleeping in mine orchard,
A serpent stung me. So the whole ear of Denmark
Is, by a forgèd process of my death,
Rankly abused. But know, thou noble youth,
The serpent that did sting thy father's life
Now wears his crown."

Who is "the serpent" the ghost refers to?

A. Horatio
B. Polonius
C. Laertes
D. Claudius

7. This is an excerpt from *Hamlet.*

"Sweet Gertrude, leave us too,
For we have closely sent for Hamlet hither,
That he, as 'twere by accident, may there
Affront Ophelia.
Her father and myself, lawful espials,
Will so bestow ourselves that, seeing unseen,
We may of their encounter frankly judge,
And gather by him, as he is behaved,
If't be th' affliction of his love or no
That thus he suffers for."

What does Claudius tell Gertrude he and Polonius are trying to find out?

A. If Hamlet is acting insane because of his love for Ophelia
B. If Hamlet is acting insane because of his grief over King Hamlet
C. If Hamlet is only pretending to be insane
D. If Hamlet is acting insane because he is ill

8. This is an excerpt from *Hamlet.*

"Horatio, I am dead.
Thou livest; report me and my causes right
To the unsatisfied."

What does Hamlet want Horatio to do?

A. Mourn for Hamlet
B. Become king of Denmark
C. Tell Hamlet's story
D. If Hamlet is acting insane because he is ill

9. This is an excerpt from *Richard III*.

"Now is the winter of our discontent
Made glorious summer by this sun of York;
And all the clouds that lour'd upon our house
In the deep bosom of the ocean buried.
Now are our brows bound with victorious wreaths;
Our bruised arms hung up for monuments;
Our stern alarums changed to merry meetings,
Our dreadful marches to delightful measures.
Grim-visaged war hath smooth'd his wrinkled front;

And now, instead of mounting barbed steeds
To fright the souls of fearful adversaries,
He capers nimbly in a lady's chamber
To the lascivious pleasing of a lute.
But I, that am not shaped for sportive tricks,
Nor made to court an amorous looking-glass;
I, that am rudely stamp'd, and want love's majesty
To strut before a wanton ambling nymph;
I, that am curtail'd of this fair proportion,
Cheated of feature by dissembling nature,
Deformed, unfinish'd, sent before my time
Into this breathing world, scarce half made up,
And that so lamely and unfashionable
That dogs bark at me as I halt by them;
Why, I, in this weak piping time of peace,
Have no delight to pass away the time,
Unless to spy my shadow in the sun
And descant on mine own deformity:
And therefore, since I cannot prove a lover,
To entertain these fair well-spoken days,
I am determined to prove a villain
And hate the idle pleasures of these days.
Plots have I laid, inductions dangerous,
By drunken prophecies, libels and dreams,
To set my brother Clarence and the king
In deadly hate the one against the other:
And if King Edward be as true and just
As I am subtle, false and treacherous,
This day should Clarence closely be mew'd up,
About a prophecy, which says that 'G'
Of Edward's heirs the murderer shall be.
Dive, thoughts, down to my soul: here
Clarence comes."

The speaker in this excerpt from Richard III uses the phrase about winter in order to...

A. Lament the loss the family has suffered
B. State that a harsh winter is on the way
C. Make a prediction about the future of the military
D. Note that life will now improve for his family

10. This is an excerpt from *Richard III*.

"Now is the winter of our discontent
Made glorious summer by this sun of York;
And all the clouds that lour'd upon our house

In the deep bosom of the ocean buried.
Now are our brows bound with victorious wreaths;
Our bruised arms hung up for monuments;
Our stern alarums changed to merry meetings,
Our dreadful marches to delightful measures.
Grim-visaged war hath smooth'd his wrinkled front;
And now, instead of mounting barbed steeds
To fright the souls of fearful adversaries,
He capers nimbly in a lady's chamber
To the lascivious pleasing of a lute.
But I, that am not shaped for sportive tricks,
Nor made to court an amorous looking-glass;
I, that am rudely stamp'd, and want love's majesty
To strut before a wanton ambling nymph;
I, that am curtail'd of this fair proportion,
Cheated of feature by dissembling nature,
Deformed, unfinish'd, sent before my time
Into this breathing world, scarce half made up,
And that so lamely and unfashionable
That dogs bark at me as I halt by them;
Why, I, in this weak piping time of peace,
Have no delight to pass away the time,
Unless to spy my shadow in the sun
And descant on mine own deformity:
And therefore, since I cannot prove a lover,
To entertain these fair well-spoken days,
I am determined to prove a villain
And hate the idle pleasures of these days.
Plots have I laid, inductions dangerous,
By drunken prophecies, libels and dreams,
To set my brother Clarence and the king
In deadly hate the one against the other:
And if King Edward be as true and just
As I am subtle, false and treacherous,
This day should Clarence closely be mew'd up,
About a prophecy, which says that 'G'
Of Edward's heirs the murderer shall be.
Dive, thoughts, down to my soul: here
Clarence comes."

Which one of these statements describes the character's feelings toward Clarence and the king?

A. He wants them to forgive one another

B. He wishes Clarence to be king

C. He believes that Edward has acted in a treacherous manner toward his brother

D. He wishes to be king to pardon Clarence

APPENDIX D

MEASURES AND CORRESPONDENCE

Measure	Correspondence
Shakespeare Knowledge Assessment	Series Creator Greg Watkins of myshakspeare.com provided permission to use questions from the website for the assessment on 6/23/22 through e-mail correspondence.
Social Presence Survey	Dr. Kristine Nowak stated that I didn't need permission but that I should cite the original article on 5/20/22 through e-mail correspondence. Dr. Ederyn Williams stated through e-mail correspondence that I could draw from his own work for the Social Presence Survey on 6/24/22.
Networked Minds Social Presence Inventory	Dr. Chad Harms provided the measurement, instructions for how to administer it, as well as permission to make adaptations to statements through e-mail correspondence on 3/18/22.

APPENDIX E

SOCIAL PRESENCE MEASURE OF COMMUNITY OF INQUIRY SURVEY

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
Getting to know other course participants gave me a sense of belonging in this course	**0**	**1**	**2**	**3**	**4**
I was able to form distinct impressions of some course participants	**0**	**1**	**2**	**3**	**4**
Online or web-based communication is an excellent medium for social interaction	**0**	**1**	**2**	**3**	**4**
I felt comfortable conversing through the online medium	**0**	**1**	**2**	**3**	**4**
I felt comfortable participating in the course discussions	**0**	**1**	**2**	**3**	**4**
I felt comfortable interacting with the other course participants	**0**	**1**	**2**	**3**	**4**

I felt comfortable disagreeing with other course participants while still maintaining a sense of trust	**0**	**1**	**2**	**3**	**4**
I felt that my point of view was acknowledged by other course participants	**0**	**1**	**2**	**3**	**4**
Online discussions helps me to develop a sense of collaboration	**0**	**1**	**2**	**3**	**4**

Note: Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *The Internet and Higher Education*, *11*(3-4), 133-136.

APPENDIX F

ADAPTED NETWORKED MINDS SOCIAL PRESENCE MEASURE

	Strongly Agree	Agree	Slightly Agree	Neither Agree nor Disagree	Slightly Disagree	Disagree	Strongly Disagree
I noticed other virtual reality book club participants	7	6	5	4	3	2	1
Other virtual reality book club participants noticed me	7	6	5	4	3	2	1
The virtual reality book club participants' presence was obvious to me	7	6	5	4	3	2	1
My presence was obvious to other virtual reality book club participants	7	6	5	4	3	2	1
Other virtual reality book club	7	6	5	4	3	2	1

participants caught my attention							
I caught other virtual reality book club participants' attention	7	6	5	4	3	2	1
I was easily distracted from other virtual reality book club participants when other things were going on	7	6	5	4	3	2	1
Other virtual reality book club participants were easily distracted from me when other things were going on	7	6	5	4	3	2	1
I remained focused on other virtual reality book club participants throughout our interaction	7	6	5	4	3	2	1
Other virtual reality book club participants remained focused on me throughout our interaction	7	6	5	4	3	2	1

Other virtual reality book club participants did not receive my full attention	7	6	5	4	3	2	1
I did not receive my virtual reality book club participants' full attention	7	6	5	4	3	2	1
My thoughts were expressed clearly to other virtual reality book club participants	7	6	5	4	3	2	1
Other virtual reality book club participants' thoughts were clearly expressed with me	7	6	5	4	3	2	1
It was easy to understand other virtual reality book club participants	7	6	5	4	3	2	1

Other virtual reality book club participants found it easy to understand me	7	6	5	4	3	2	1
Understanding other virtual reality book club participants was difficult	7	6	5	4	3	2	1
Other virtual reality book club participants had difficulty understanding me	7	6	5	4	3	2	1
I could tell how other virtual reality book club participants felt	7	6	5	4	3	2	1
Virtual reality book club participants could tell how I felt	7	6	5	4	3	2	1
Other virtual reality book club participants' emotions were not clear to me	7	6	5	4	3	2	1

My emotions were not clear to other virtual reality book club participants	7	6	5	4	3	2	1
I could describe virtual reality book club participants' feelings accurately	7	6	5	4	3	2	1
Other virtual reality book club participants could describe my feelings accurately	7	6	5	4	3	2	1
I was sometimes influenced by other virtual reality book club participants' moods	7	6	5	4	3	2	1
Other virtual reality book club participants were sometimes influenced by my moods	7	6	5	4	3	2	1
Other virtual reality book club participants' feelings influenced the mood of our interaction	7	6	5	4	3	2	1

My feelings influenced the mood of our interaction	7	6	5	4	3	2	1
Other virtual reality book club participants' attitudes influenced how I felt	7	6	5	4	3	2	1
My attitudes influenced how other virtual reality book club participants felt	7	6	5	4	3	2	1
My behavior was often in direct response to other virtual reality book club participants' behavior	7	6	5	4	3	2	1
The behavior of other virtual reality book club participants was often in direct response to my behavior	7	6	5	4	3	2	1
I reciprocated other virtual reality book club participants' actions	7	6	5	4	3	2	1

The virtual reality book club participants reciprocated my actions	7	6	5	4	3	2	1
Other virtual reality book club participants' behavior was closely tied to my behavior	7	6	5	4	3	2	1
My behavior was closely tied to other virtual reality book club participants' behavior	7	6	5	4	3	2	1

Note. The source has been modified from its original version (Harms & Biocca, 2004). The responses for certain questions should be reverse coded (7, 8, 11, 12, 17, 18, 21, 22).

APPENDIX G

SOCIAL PRESENCE SURVEY

1. To what extent was this virtual reality experience like you were in the same room with the other participants?

0	2.5	0.5	0.75	1
A lot like being in the same room				Not like being in the same room at all

2. To what extent did other participants seem "real" while engaged in this virtual reality experience?

0	2.5	0.5	0.75	1
Very real				Not at all real

3. How likely is it that you would choose to use a virtual reality system to work with peers in furthering everyone's knowledge about another academic subject?

0	2.5	0.5	0.75	1
Very likely				Not likely at all

4. To what extent did you feel you could get to know someone that you met only through this virtual book club?

0	2.5	0.5	0.75	1
Very well				Not at all

Note: In accordance with the research practice of Nowak and Biocca (2003), participants will use the mouse to place their response on a sliding scale to the nearest hundredth.

APPENDIX H

INTERVIEW PROTOCOL

Date of Interview: _____
Interviewer: _____
Interviewee: _____

Greetings. Thank you for signing the informed consent form.* I will be asking a series of questions about virtual worlds and their relationship to the works we studied during the virtual reality book club. I will also be asking questions about certain social aspects of the educational experiences. I am thinking the interview will take about 30 minutes and it will be recorded so I can best recall what was said. Please let me know if you have questions about what I am asking or if you need to take a break. Are you ready to begin? (hit record).

Shakespearean Knowledge Questions (Research Question #1)

1. Share with me examples of how visiting the throne room and the theater helped you understand the setting and characters of Macbeth.

a. Follow up: if they only mention one virtual world room, ask specifically about the other virtual world room?

2. Describe examples of how experiencing the Pantheon and the theater helped you learn about the setting and characters *The Tragedy of Julius Caesar*.

a. Follow up: if they only mention one virtual world room, ask specifically about the other virtual world room?

3. Share examples of how visiting the Temple of Herod, the Cemetery, and the theater helped you gain knowledge of *Hamlet.*

a. Follow up: If each virtual world room is not mentioned, ask specifically about the other virtual world room(s)?

4. Discuss examples of how your time in the throne room, the cathedral, and the theater helped you understand the era and events of *Richard III*.

a. Follow up: If each virtual world room is not mentioned, ask specifically about the other virtual world room(s)?

Social Presence Questions (Research Question #2)

5. Share with me a couple examples that best describe your overall experience in the virtual reality book club?

6. Share examples when your avatar's behavior was in response to the behavior of another person's avatar within virtual reality.

7. Conversely, describe examples when you felt another participant's avatar exhibited behaviors in reaction to your own avatar's behavior.

8. Describe examples when other book club participants' avatars caught your attention within the virtual worlds.

9. Offer situations when another participant's avatar influenced your own emotional response when within the virtual worlds. Follow up: emotional responses can be positive (joy, excitement, intrigue) or negative (anger, frustration, disappointment).

10. Identify examples when it was both easy as well as difficult to understand what other participants were saying when in the virtual worlds. Follow up: How often did you feel the other participants understood what you were trying to communicate when in the virtual worlds? Explain.

11. Describe examples where you felt you could understand how other participants felt when engaged in virtual reality. (*Perceived Affective Understanding*)

12. Share with me examples when you focused on another participant's avatar within the virtual worlds.

Thank you so much for telling me about your experiences in the virtual reality book club. Is there anything else you want to share with me about social aspects of the virtual world experience? Is there anything else you want to share with me about learning Shakespeare through your participation in this virtual reality book club? I hope you have enjoyed participating in this research. Have a wonderful day.

*Alternative: Thank you for participating in this research study.

Note: Sometimes students were asked follow-up questions. For example, students were asked questions such as "Could you elaborate on that?" or "Tell me more about _____." Questions were also sometimes repeated.

APPENDIX I

ALIGNMENT BETWEEN QUESTIONS FROM THE ADAPTED VERSION OF THE NETWORKED MINDS SOCIAL PRESENCE MEASURE, PARTICIPANT INTERVIEWS, AND WRITING PROMPTS

Networked Minds Social Presence Measure (Example)	Participant Interview Questions	Writing Prompts
Co-Presence		
Other virtual reality book club participants caught my attention	Describe examples when other book club participants' avatars caught your attention within the virtual worlds.	Describe a situation when another participant's avatar caught your attention at the pantheon. Describe a situation when another participant's avatar caught your attention at the Temple of Herod. Discuss a situation when another participant's avatar caught your attention at the theater.
Perceived Affective Understanding		
Other virtual reality book club participants' emotions were not clear to me	Describe examples where you felt you could understand how other participants felt when engaged in virtual reality.	Share examples when you believe you could understand the emotions displayed by another participant's avatar while discussing *The Tragedy of*

		Julius Caesar in the theater. Write examples where you felt you could accurately describe how another participant was feeling while at the cathedral.
Perceived Message Understanding		
It was easy to understand other virtual reality book club participants	Identify examples when it was both easy as well as difficult to understand what other participants were saying when in the virtual worlds.	Offer an example when you were at the pantheon discussing the speech of Cassius and another participant's thoughts were communicated clearly to you. Share detailed examples of how other participants' thoughts were clear to you at the cemetery. Write examples where you felt you could accurately describe how another participant was thinking when discussing *Richard III*. Share an example when you thought another participant found it easy to understand you while at the theater.
Perceived Emotional Understanding		

Other virtual reality book club participants feelings influenced the mood of our interaction	Offer situations when another participant's avatar influenced your own emotional response when within the virtual worlds.	Describe a time when you were in the theater discussing *The Tragedy of Julius Caesar* and the attitude expressed by another participant's avatar influenced how you felt. Provide an in-depth response detailing when another participant's avatar's attitude influenced how you felt while at the cathedral.
Perceived Behavioral Interdependence		
My behavior was often in direct response to other virtual reality book club participants' behavior	Share examples when your avatar's behavior was in response to the behavior of another person's avatar within virtual reality.	Describe a situation after watching the performance from *Macbeth* when your avatar's behavior was in response to another participant's avatar's behavior. Describe a time when your avatar's behavior was closely tied to another participant's avatar at the theater when discussing *Macbeth*. Share an example when your avatar's behavior was in response to another participant's avatar while in the theater.

The behavior of other virtual reality book club participants was often in direct response to my behavior	Conversely, describe examples when you felt another participant's avatar exhibited behaviors in reaction to your own avatar's behavior.	Offer some examples when another participant's avatar's behavior seemed as though it was a response to your own avatar's action in the throne room. Describe a situation when another participant's avatar's behavior was a response to your own avatar's actions while at the theater.

Note: The questions in this table were adapted from the original questions used by Harms and Biocca (2004).

APPENDIX J

COMMUNICATION FROM INSTITUTIONAL REVIEW BOARD

INSTITUTIONAL REVIEW BOARD FOR HUMAN RESEARCH
APPROVAL LETTER for EXEMPT REVIEW

John Ott Jr.
[redacted]

Re: **Pro00123079**

Dear Mr. John Ott:

This is to certify that the research study ***Shakespeare in* Virtual Reality: Social Presence of Rural Students in a Virtual Reality Book Club** was reviewed in accordance with 45 CFR 46.104(d)(1), the study received an exemption from Human Research Subject Regulations on **9/1/2022**. No further action or Institutional Review Board (IRB) oversight is required, as long as the study remains the same. However, the Principal Investigator must inform the Office of Research Compliance of any changes in procedures involving human subjects. Changes to the current research study could result in a reclassification of the study and further review by the IRB.

Because this study was determined to be exempt from further IRB oversight, consent document(s), if applicable, are not stamped with an expiration date.

All research related records are to be retained for at least three (3) years after termination of the study.

The Office of Research Compliance is an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). If you have questions, contact Lisa Johnson at lisaj@mailbox.sc.edu or (803) 777-6670.

Sincerely,

Lisa M. Johnson
ORC Associate Director and IRB Manager

INSTITUTIONAL REVIEW BOARD FOR HUMAN RESEARCH
EXEMPT AMENDMENT APPROVAL LETTER

John Ott, Jr.
[redacted]

Re: **Ame1_Pro00123079**

Dear Mr. John Ott:

This is to certify that the Amendment requested on **10/6/2022** for research study ***Shakespeare in Virtual Reality: Social Presence of Students in a Virtual Reality Book Club*** was reviewed and approved by the University of South Carolina Institutional Review Board (USC IRB) on **10/12/2022**.

The requested revision does not change the current Exempt status; therefore, further IRB oversight is not required unless additional changes are required. Because changes could result in a reclassification of the study, you must inform the IRB of any changes in procedures involving humans.

All research related records, including Informed Consent document(s), if applicable, are to be retained for at least three (3) years after termination of the study.

The Office of Research Compliance is an administrative office that supports the University of South Carolina Institutional Review Board (USC IRB). If you have questions, contact Lisa Johnson at lisaj@mailbox.sc.edu or (803) 777-6670.

Sincerely,

Lisa M. Johnson
ORC Associate Director and IRB Manager